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Ghana's New Gambit

IN emergent countries, which have achieved independence within the past few years, the temptation to sacrifice statesmanship on the altar of immediate political expediency—to which all governments are in varying degree exposed—must often be particularly great. In the minds of many Africans there is an understandable tendency to equate self-government with higher wages and living standards. In simple, but not in appropriate language, they expect the government to bring home the bacon, and they want at least a slice of it now. Speedy and even spectacular results are therefore essential to the popularity and the very survival of the Administration.

This situation imparts an element of urgency even to the actions of autocratic rulers like Dr. Nkrumah in countries such as Ghana which have been enjoying the fruits of political independence for several years. It explains the apparent inconsistency between the Ghana Government's efforts to attract the immense sums of capital needed for the ambitious programme of industrial development on which Dr. Nkrumah has set his heart, and the wilder manifestations of economic nationalism which, taken at their face value, can scarcely fail to sap the confidence of foreign investors.

In presenting the National Assembly with the £350,000,000 Second Five-Year Development Plan, Dr. Nkrumah emphasised that the government's ability to execute the plan would largely be influenced by what could be done to obtain capital from overseas, not only from international institutions but also from private investors. Moreover, the constitution of the Republic provides safeguards for those who back their faith with cash. So far as the gold mining industry is concerned, the government's attitude has hitherto been one of realistic and friendly co-operation, a notable example of its sympathetic approach to the industry's problems being the advance to Amalgamated Banket Areas announced early last year.

On several occasions the positive steps taken by the governments to attract expatriate capital have been hampered by the more extreme pronouncements of politicians or civil servants apparently holding responsible positions. For example, there was the nationalization scare last autumn, when demands for a State trading corporation to take over certain industries (not including mining) were put forward at a joint conference of the ruling Convention People's Party and other important bodies. These proposals, though repudiated by Dr. Nkrumah and his Finance Minister, Mr. Gbedemah, aroused considerable misgivings which have not been wholly allayed.

Now the government itself has dealt a severe blow to investor confidence by enacting a new law which imposes very heavy penalties for closing down a mine without permission. Though aimed at gold mines, it establishes principles which could readily be extended to any other form of mining. This remarkable piece of legislation and the reasons for it, as well as some of the potential

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consequences, were discussed in our last week's issue (page 106). To recapitulate briefly, mining costs were sharply increased by the government's decision last summer to raise the minimum wage for Africans by a shilling; consequently, the boards of Amalgamated Banket Areas and Bibiani, both marginal mines, have announced that they have no alternative but to suspend all development operations. The government's answer was the Mines (Amendment) Bill

Under this new law a company wishing to avoid financial hardship may do so by surrendering the concession in question, but it may then be required to surrender one or more of its other concessions, or an associate company may be required to surrender concessions. On the face of it, the government is apparently empowered to acquire part of the Ashanti property as the price for allowing Bibiani to close down, or part of Ariston for sanctioning the curtailment of operations at A.B.A. !

It is right that governments should seek to minimize the impact on regional and national economies of the closing down of major mines, a problem which is at the present time a matter of particular concern to the Union of South Africa, for the pending closure of several gold producers will obviously be a heavy blow to Brakpan and other East Rand towns. In some countries licensees and concessionaires are accordingly required to notify the government within a stipulated period of their intention to suspend mining operations, but the practice is by no means universal. In the case of South Africa, for example, mines on a claim basis have the right to close down without prior notification, but those holding leases are obliged to give three months' notice of their intention to do so. The Government Mining Engineer, at his discretion, may, however, set up a commission to investigate the conduct of operations at a property held under lease. If the Commission's findings were unfavourable, the lease could be withdrawn from the existing holder and offered elsewhere. If no interested party could be found, the government might conceivably be prepared to consider subsidizing the operation or possibly taking it over itself.

Some governments are empowered to regulate production under mining concessions; in the case of Egypt, for example, concessionaires may be ordered to increase production. Article 43 of Egypt's Mining Law also provides that the government may requisition a mine " in the event of the lessee stopping work in the mine or plant or limiting production without necessity with resultant deficiency in the supply of the country ". Concessionaires are also liable, in some countries, to forfeit their leases or licences in the event of non-compliance with certain working obligations. Under Mexico's mining law proof of regular work must be presented.

None of these measures, however, is remotely comparable to the Ghana Government's new powers to compel mining companies to remain in operation. Indeed, the nearest precedent we can find is the mining law passed by the Cuban Cabinet towards the end of 1959, whereunder the government may order the reactivation of any inactive mine if considered in the national interest. Failure of a concessionaire to resume operation of the mine within sixty days after receiving notification involves the automatic cancellation of concession rights and the transfer of the mine to government ownership.

Even President Castro, however, cooked up nothing quite so original as the Ghana Bill's provision authorizing the government to acquire the concessions of an associated company. It need scarcely be pointed out that Ashanti and Bibiani are entirely separate entities owned by different sets of shareholders. The association behind them is purely on the management side, as a matter of technical convenience. This form of association is, indeed, characteristic of the British overseas mining industry. To take over part of Ashanti because Bibiani was closing down would be a form of expropriation which, in the words of Major-General Sir Edward L. Spears, chairman of Ashanti, " would make it quite impossible to obtain any further capital for investment in mining enterprises in Ghana ".

While the government's latest action is bound to have an unfavourable impact on future investment, too much significance should not be attached at this stage to a measure which was passed in haste, may well be regretted and quite possibly will never be implemented. Dr. Nkrumah has consistently shown a realistic appreciation both of the country's investment needs and of gold mining's importance to the national economy. It seems in the highest degree improbable that just when the cherished Volta River project is almost within his grasp, he should be prepared to risk putting Western capital to flight by putting a squeeze on private enterprise. It is regrettable that the closing down of A.B.A. should have unfavourable repercussions on the important development project for the Tarkwa valley. The cheapest solution to the problem might well be an increased subsidy for A.B.A.

The Ghana authorities have conceded that companies will be allowed to discontinue operations where it can be shown that workable orebodies have been exhausted or that further mining would be permanently uneconomic. Thus the government is in a position to adopt a more tractable attitude without loss of face. Basically the interests of the mining companies and the country are very closely linked, as Dr. Nkrumah has always recognized. The chairman of both the mining groups concerned are at present in Ghana and it will be surprising indeed if the issues cannot be resolved on a friendly and reasonable basis.

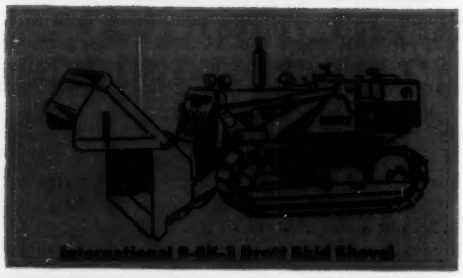
The case of Ghana and the marginal gold mines highlights the need, repeatedly stressed in these columns, for some form of international indemnity against the political risk. The hazards covered, it would now appear, should include losses incurred through compulsory production under sub-economic conditions, together with fines imposed on directors and company officials and, of course, tobacco and other comforts for those in gaol !

AFRICAN ADVANCEMENT IN PRACTICE

The theory of African Advancement on the Rhodesian Copperbelt is a subject that is familiar to most and the agreements reached between the N.R. Mineworkers Union and the M.J.I.C. (discussed in *The Mining Journal*, Nov. 11, 1960), were of great interest. It is, however, the practical implementation that is of most importance.

In their paper on the Nchanga mine presented to the I.M.M. on January 19, Mr. M. W. Rushton and Mr. K. E. Mackay outlined the improvements that have been made since the mine re-opened in 1937. At that stage there were the three main wage scales, 15s., 20s., and 25s. per 30 day ticket with a few clerks in the 40s. range. Today there are eleven main scales in both the Daily Paid and Staff sections, the wages ranging from £19 per month to £70 per month which represents an annual increase of about 13 per cent. It is doubtful if any other area has managed to sustain such a record over a period of 27 years.

Coincident with these direct wage improvements there have, of course, been considerable advances in the standard of African housing, hospitalization and general working conditions. The most marked improvement is probably in housing, for today most houses have a living room, two bedrooms and a kitchen, while the latest will have three bedrooms and a floor area of over 700 sq. ft.



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This is certainly African Advancement in practice, a record which even the African union leaders would hesitate to deny. However, the all important question today, is whether the African is, in fact, satisfied with these spectacular material advances not whether he should be. The African is looking, not only for financial gains, but for at least the opportunity for parity with the European worker. The foundation stone for such a step has undoubtably been laid in the recent agreements; success now rests upon the good will of all the parties involved.

COAL DERIVATIVES

The "Report of the Committee on Coal Derivatives" has recently published its findings, after reviewing the work that has been done in recent years on the development of processes in which coal is the basic raw material and which will produce marketable products of chemical, gaseous or liquid hydrocarbons. Many will find this report somewhat discouraging for after a careful survey the Wilson Committee conclude that the prospects for the large scale production of oil from coal are so remote that current development work on the Fischer-Tropsch process should be discontinued in Britain. The main conclusions and recommendations of the Committee are as follows:—

Carbonization will continue to be the most important method of processing coal in the U.K. and the future size of the carbonization industries will be determined by the demand for coke although very substantial quantities of gas and chemicals will continue to be made this way.

Town gas offers the greatest scope for expansion, but to expand effectively new plants will need to make gas more cheaply than the existing ones. The Lurgi process is the most promising method now available for basing such an expansion on coal. However, gas made by this process must be enriched before it is suitable for use as town gas and there is at present no commercial process for making rich gas direct from coal. The committee are fairly optimistic that improvements in gasifying techniques will eventually result in a significant reduction in the cost of gasifying coal.

The Report indicates that the prospects for making oil from coal economically in this country are so remote that when the work at present in hand has been completed no further technological work specifically directed towards the oil-from-coal process should be undertaken. But the major part of the cost of the complete process is accounted for by the cost of making synthesis gas, and the Committee recommends that the economics of making oil from coal should be reviewed whenever there is a substantial advance in coal gasification. The Report recommends that when the current technological work at the Warren Spring Laboratory on the Fischer-Tropsch synthesis process is rounded off, work on basic studies should be intensified.

Regarding chemical uses for coal it is concluded that the increasing demand for aromatic chemicals could in the main be met by additional extraction from benzole and coal tar available as by-products from carbonization. However, to expand in this way the products will have to be competitive with the alternatives based on oil. The existing arrangements for research in this field are adequate.

While agreeing with the general factual content of the Wilson Report nonetheless there are certain features which do not appear to have been given due emphasis. Although the committee found that an expenditure of some £10,000,000 to £20,000,000 would be needed to develop fully oil-from-coal techniques and associated pilot plants, this expenditure, when considered against the current N.C.B. investment industry of £100,000,000 a year assumes rather less frightening proportions than when considered alone. It would seem that with such a large market for coal possibly available the spending of £20,000,000 for an industry with a £1,000,000,000 a year turnover is not so prohibitive. Again it must be borne in mind that when considering the long-term prospects for coal the present differential between natural oil and that produced from coal may no longer exist. As the world's oil resources diminish, prices will rise correspondingly and the prospect of this happening is not so far off as to be discounted. Again, quite apart from natural depletion of oil resources the current position is very unsatisfactory so far as Britain is concerned in that, having no natural resources of her own, the country is absolutely dependent on the vagaries of the international political situation. It is essential that every possible step should be taken to ensure that the fullest possible use is made of the one indigenous fuel of which the country has sufficient.

However, the committee do recommend that basic work at the Warren Spring Laboratory of the D.S.I.R. should be intensified to cover new studies, and close contact maintained with the South Africa SASOL plant and any other industrial oil-from-coal projects. This, they say, would keep in being a body of men knowledgeable in catalytic reactions so that, whenever it seemed desirable, work on oil-from-coal processes could be restarted with a minimum of delay.

RUSSIAN COPPER RESERVES

We are endebted to Lt.-Col. Kowalewski for information on two important copper deposits, recently discovered in the U.S.S.R., which supplements the survey published in our issue of December 30, 1960, p. 736.

In the late 'fifties the Gay copper deposits were discovered. Situated some 30 km. south of Orsk (Orenburg Steppes), they comprise five orebodies containing copper zinc sulphides, the most important being the No. 1 and No. 3 orebodies with an average content of 4 per cent copper, rising in some sectors to 11-12 per cent. Samples are reported to have assayed up to 30 per cent copper! These deposits are claimed to be unique.

The No. 1 and No. 3 orebodies are now being prepared for intensive exploitation, the former as an opencast mine (the orebody lies 70-90 m. under the surface) and the latter partly by opencast methods and partly by underground methods. Two shafts now being sunk were planned to strike the latter orebody at 170 m. "as soon as possible". In July, 1960, one of them reached this depth and copper from this mine has already been smelted at the nearby Mednogorsk smelter. At present 15,000 workers are employed on these deposits and a settlement for 60,000 people is under construction. The aggregate output from the opencast and underground operations is scheduled to reach 15,000,000 tons annually in 1963 and will enable output from the Ural smelters to be doubled.

Geological prospecting of the whole of the adjoining region, between Orsk and Buribay, is in progress, and near Dzhusinskyi, in the Tarensay region, another important deposit has been discovered. The immense reserves of this area are now being evaluated.

A few years ago copper deposits (of sandstone type) were discovered in the Udokan mountain range, about 600 km. N.E. from Chita (Transbaykalye). During the summer of 1960 equipment and supplies were transported there by helicopters and at the beginning of this winter construction of a winter road from Chita was commenced. The deposits are very large and are to be mined by underground methods. An ore processing plant is to be erected to produce concentrates containing 18 to 22 p.c. copper.

RECOVERY OF MINERALS FROM W. AUSTRALIAN BEACH SANDS

THE principal beach sand deposits of economic importance in Western Australia are located on the southern end of the western coast line between the towns of Bunbury and Busselton.

There are other deposits, particularly along the southern coast as indicated on the accompanying map, but the recovery plants operated by Cable (1956) Ltd., Western Titanium No Liability, Ilmenite Proprietary Ltd. and Westralian Oil Ltd., are all situated between Bunbury and Busselton. All production is shipped through the port of Bunbury.

The main lines of the various flowsheets are as follows:

Cable (1956) Ltd. at Bunbury is the pioneer company and operates on the foreshore of Koombana Bay close to the port of Bunbury. Mineral sands are won from the dunes by earth moving equipment and washed over a ¼ in. screen to remove the trash.

The pulp is fed to 14 rotating cones to remove the silica which is returned to the worked out area for regeneration of the surface. The heavy mineral is pumped to two oil fired driers and after passing a 30 mesh screen is fed to magnetic roll type separators. The rough ilmenite concentrate produced by these machines is cleaned in high tension machines and the tailing joins that from the magnetic section and is stockpiled. No treatment of this fraction for the recovery of other minerals has been attempted.

Western Titanium No Liability operates at Capel some three miles inland. Material is won by sluicing with monitors and the gravity concentration is by spirals. The circuit includes attrition units to clean the coated particles of heavy mineral.

The dewatered concentrates are dried in a wood fired kiln and after screening are fed to magnetic separators which produce an ilmenite concentrate. The tailings from this operation pass through high tension separators and the conductors after magnetic cleaning join the ilmenite concentrate.

The tailings from the ilmenite section pass to the secondary wet treatment and are treated in a gravity circuit employing spirals, an attritioner and tables. Concentrate passes to the secondary dry plant and the tailing is discarded.

In the secondary dry plant the first separation is by electrostatic plate separators which take off monazite and zircon as non-conductors and rutile and leucoxene as conductors. Several stages of electrostatic and magnetic cleaning are followed by final cleaning on wet tables and monazite, zircon, leucoxene and rutile concentrates are marketed.

Ilmenite Proprietary Ltd., at Wonnerup close to the beach on Geographe Bay about 5 miles from Busselton, obtains the crude sands by drag line and makes a concentrate with rotating cones close to the working face. The wet concentrate is brought to the plant in motor trucks and after being dried in oil fired kilns and screened passes over low intensity magnetic separators which produce ilmenite concentrate. The reject passes over high tension separators producing a crude ilmenite concentrate which is cleaned on high intensity magnetic separators. The reject from both stages is sent to stockpile for subsequent recovery of the valuable minerals. This stage of treatment has not yet been commenced. The concentrate is taken by road to Bunbury and stored in bins from which it is transferred to the ship's side in steel kibbles.

Westralian Oil Ltd. has a gravity concentration plant at the Yoganup deposits some 8 miles from the dry concentration plant at Capel. The sand is won by draglines and is hauled in motor trucks to an apron from which it is washed to a pump. It passes through two de-sliming cones in series and then to spiral concentrators. Middlings are recleaned in secondary spirals and the dewatered concentrates are carted by motor truck to the Capel plant.

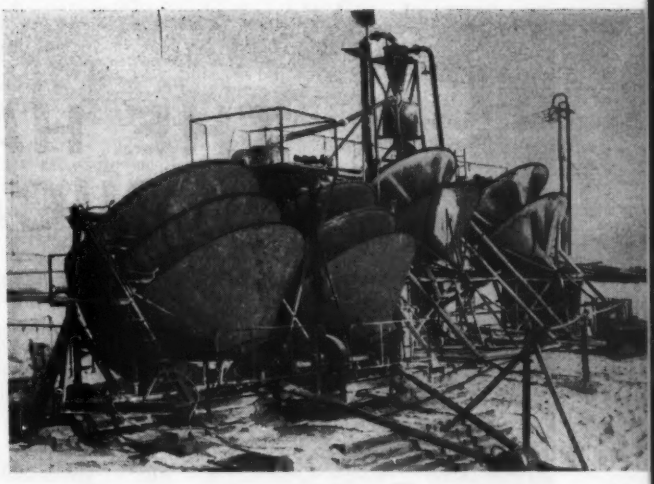
The treatment here is unusual in that the first stage of treatment after drying in a flash drier and screening is by high tension separator. The conductors, after treatment by magnetic separation, yield ilmenite concentrate while the non-conductors are treated on an electrostatic plate separator to produce clean non-conductors and the conductors return to the head of the first stage.

The non-magnetic fraction is given another pass over roll type magnetic separators which remove the remaining feebly magnetic ilmenite. The non-magnetic fraction receives several stages of electrostatic and high tension cleaning producing finally three products; ilmeno-leucoxene, leucoxene and a non-magnetic product which is stockpiled for later treatment. Concentrates are transported to bins at Bunbury by road and are moved to the ship's side in kibbles.

The market position in regard to ilmenite, which is the main product from all plants, has recovered to some extent from the recession of 1957 and 1958. During that period ilmenite was sold at very low levels and the current price still reflects this situation.

The total capacity of the four plants is in the vicinity of 250,000 tons of ilmenite per annum. Monazite, zircon, rutile and leucoxene are also available from production and reserves of crude concentrates are accumulating.

The Mining Journal is indebted to the Australian Association of Beach Sands Producers for this information and the accompanying map and illustration.



General view of rotating cones

Problems of the Philippine Gold Mining Industry

The problems confronting the Philippine gold mining industry were reviewed by John C. Bardey, outgoing president of the Philippine Gold Producers' Association, in his annual report for the fiscal year ended June 30. This summary of some of the more important portions of the report is published with acknowledgements to "Philippine Mining Journal"

THE gold output of the Philippines during the year ended June 30, 1960, totalled 398,211 oz. with an estimated sales value of P57,206,992, compared with 401,538 oz. worth P54,030,953 in 1958-59.

Although the fiscal year ended June 30, 1960 could be considered moderately prosperous from an earnings standpoint, several danger signs were hoisted during the period signalling a treacherous and rocky course ahead for the gold mining industry. Factors which might be considered beneficial for the economy as a whole, nevertheless spell doom for the industry. Stabilization of the peso, decontrol of foreign exchange, lifting of import restrictions—these and other factors will bring about collapse of the industry unless the monetary officials of the country and the legislature intervene to forestall closure of the gold mines.

Decontrol

Since December 9, 1949, the Philippine economy, due to an unfavourable balance of foreign exchange payments, has operated under a very stringent foreign exchange and import control system administered by the Central Bank of the Philippines.

Although the control system has been partially successful, it has caused certain serious dislocations in the economy. Recognizing this and believing that the day should be hastened when a free economy should be resumed, the monetary authorities on April 25, 1960, promulgated and set in motion a plan of gradual decontrol.

In effect, the decontrol plan adopted sets up a multiple exchange rate system. Dollar proceeds from the majority of exports are purchased by the Central Bank during the initial phase of decontrol at an effective rate of P2.30 to $1.00 as compared to P2.00 to $1.00 prior thereto. During the second phase, the Bank's buying rate for export dollars will be at an effective rate of P2.60 to $1.00; during the third phase, P2.90 to $1.00; and at P3.20 to $1.00 upon full decontrol. It was expected that the second phase of decontrol would become effective in 1960.

The cost of purchasing dollars for the payment of machinery, spare parts, chemicals, explosives and supplies varies according to the commodity category classification decided by the Central Bank and so the effective Banks' selling rate for imports may be P2.00 to $1.00, P2.50 to $1.00, P3.20 to $1.00, or P4.00 to $1.00. The majority of items imported by the gold industry for its use presently fall within the P2.50 to $1.00 category, but it is expected that as the decontrol plan progresses toward complete decontrol more items must be purchased on the basis of the P4 to $1 rate. The result—a progressively increasing peso cost of machinery, spare parts, and supplies used in gold producers' mining operations.

Under the present decontrol plan, dividends declared on profits earned subsequent to January 1, 1960 may be remitted at P3.20 to $1.00 plus 25 per cent margin fee or an effective rate of P4.00 to $1.00. Likewise, payment in dollars for services rendered abroad are remittable at the P4 to $1 rate. Allowable foreign technicians' salary remittances are remittable one-half at the P4 to $1 rate and one-half at P2.50 to $1.

Taxes

Since January 1960, except for a few special items, all imported machinery, spare parts and supplies used by the gold mining industry have been subject to payment of a 25 per cent margin fee on the foreign exchange purchased for their procurement, a 10.2 per cent Special Import Tax and an increase from 25 per cent to 50 per cent of the regular duty on items imported from the U.S. (in accordance with

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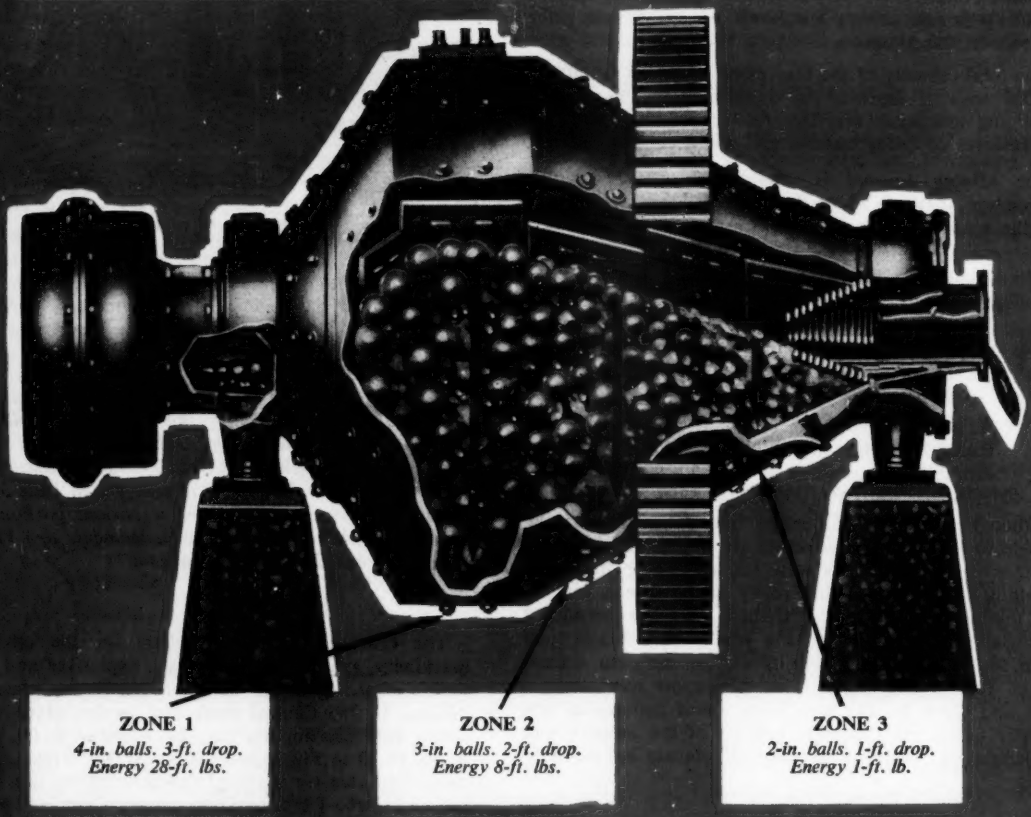

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the provisions of the Laurel-Langley Agreement). These taxes, together with the increase in the exchange rates covering some items, have imposed an additional tax burden upon the industry accounts for a drop during the first six months of 1960 in the operating profits of gold mining companies. The cost of producing one ounce of gold during the first half of 1960 has risen from P10 to P15 over the cost for the same period of 1959.

The selling price of gold to all outlets during the year by the member mines averaged P143.66 per ounce as compared to P134.56 per ounce for the 1958-59 fiscal period.

Pursuant to the provisions of Central Bank Circular No. 106, implementing the partial decontrol plan, firms operating in the Philippines may now readily remit dividends of stockholders abroad through the purchase of free market dollars (Rate : P3.20 to $1.00 plus 25 per cent Margin Fee). Prior to decontrol many so-called foreign firms regularly remitted their profits abroad through the purchase of gold, as provided by Monetary Board Resolution No. 224 Central Bank Circular No. 73. With gold at P150 per ounce the effective rate of remittance was P4.285 to $1. Since these companies may now remit at P4 to $1, they have become lost as customers of the gold producers.

There remains in Special Blocked Fiduciary Accounts as of this writing about P50,000,000, representing unremitted profits earned prior to January 1, 1960. The only medium by which these funds may be legally converted to U.S. dollars is via the purchase of gold. Because of the decontrol plan, owners of these funds appear willing to speculate on the future dollar-to-peso rate two or three years hence when decontrol is expected to be total and complete, and free convertibility at from P3.00 to P3.50 per $1.00 may be realized. As a result, demand for gold has receded and pressure to reduce the gold price to P140 per ounce is persistent. Some July, 1960, production has been sold at P145 per ounce. Since production costs have already risen and are expected to continue their upward march any further reduction in price will reduce the profit margin to nil and ultimately force closure of the mines.

Legislation

During the 1960 session of the Congress a Bill was presented and passed which amends Section 30 (g) of the Internal Revenue Code as regards the method of computing depletion allowance. The Bill provides that the depletion allowance may be 23 per cent of the gross income of gold, providing that the said allowance does not exceed 50 per cent of the net income or net profit.

The Philippine Gold Producers' Association and its members, in conjunction with the Base Metals Association of the Philippines, endeavoured to obtain passage by the Congress of two vital pieces of legislation, to wit: (1) Amendment of Paragraph 13 of Section 5 of the Corporation Law, and (2) Amendment of Commonwealth Act No. 137 known as the Mining Law.

At present, the Corporation Law prohibits one mining company from "in any wise being interested in another" mining company. This law is antiquated, unjust, and restrictive to the point where the technical know-how and capital of well-established and successful mining enterprises cannot be advantageously employed in new mining ventures without employing arrangements of dubious legality.

The Congress failed to act on either of the above-mentioned amendments due to the pressure of what it considered more important legislation. Efforts to obtain favourable consideration of these amendments are being continued.

Australia's Search for Uranium

THE oversupply of uranium is not discouraging Australia's search for ore reserves. In its report for the year ended June 30, 1960, the Australian Atomic Energy Commission emphasizes that known uranium reserves would be insufficient to meet the steadily increasing requirements for nuclear power stations (expected to develop from the 1970's onwards), until the end of the century. Australia, in particular, it is stated, has not established enough ore reserves for probable future requirements; consequently the Commonwealth's policy has been to undertake the basic survey work essential to a successful exploration programme, as well as to provide various services and incentives to prospectors and mining companies. These broad surveys have been aimed at delineating areas in which further prospecting is justified.

The Bureau of Mineral Resources continued its airborne surveys for uranium, states the report. The Auster aircraft formely used was replaced late in 1959 by a Cessna, while a DC - 3 aircraft collected radiometric information over a total area of about 60,000 sq. miles during the course of aero-magnetic surveys. Maps were issued showing the location of radiometric anomalies detected by geophysical surveys. The Bureau's programme of regional geological mapping continued and, in addition, several prospects were tested by diamond drilling and underground exploration.

Companies also carried out important exploration. Results of work to date at Rum Jungle Creek South indicate an orebody of possible economic size and grade, states the report (the discovery of a high grade uranium orebody at Rum Jungle) was recently announced. Queensland Mines Ltd. carried out further exploratory diamond drilling of Anderson's Lode and the Skal Lease in the Mount Isa district, Queensland. Company reports show that some 8,000 ft. of further diamond drilling added significantly to the indicated ore reserves of Anderson's lode, which are now of the order of 1,300,000 s.tons of ore containing some 2,100 s.tons of uranium oxide. The same company put down eight holes on the Skal Lease, the deepest to 800 ft. There has been insufficient drilling to assess the true potential of this deposit, but conservative estimates place the content at 300,000 s.tons of ore grading 0.13 per cent.

A recent technical development applied by Mary Kathleen Uranium Ltd. could have a considerable influence on the economics of mining and treating radioactive minerals. The occurrence of ore in the Mary Kathleen deposit is irregular; selective mining practices were therefore progressively refined so as to eliminate as much waste as possible from the mill feed. In order to reduce the amount of waste still further, the company installed an electronic sorting unit between the crushing and grinding sections of the mill. Exploration has considerably increased the tonnage of "possible ore" at Mary Kathleen.

The five Australian producers are selling under contracts with the Combined Development Agency and the U.K. Atomic Energy Authority, the last of which will be completed not later than 1966.

The Mary Kathleen orebody contains significant reserves of thorium and work is now proceeding to assess the possibility of extracting it economically. However, Australia's total reserves of thorium are still quite limited. The Bureau of Mineral Resources has therefore been requested to investigate thoroughly the whole question of conservation of monazite contained in the tailings of the heavy mineral beach sand concentrating plants on the east coast and in the Capel-Bunbury area of Western Australia. Meanwhile the Commission has decided not to buy any more high grade monazite concentrates.

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Increasing Bulk Output and Productivity in Coal Mining

The following article is a condensation of the Presidential Address given by R. A. Moore, O.B.E., B.Sc., on January 27, 1961, to The Institution of Mining Engineers

THE general aspect on which I would wish to address you today can be summed up as the need to improve output concentration and productivity. In his most thoughtful address last year, Mr. Richard Baker dealt with the need to have the utmost degree of flexibility in the mining industry. There is no doubt that, 12 months later, this is even more true, and the most difficult problem facing forecasters is to say what amount of coal will be needed, and in what grades and sizes. An indication has been given during recent months, by Sir James Bowman, of the tonnage of coal likely to be needed for conversion into electricity—our most important market. Sir James quoted the power station demand for coal for 1960 at 46,000,000 tons and put the corresponding figure for the late 'seventies at 80,000,000 to 90,000,000 tons, approximately half the total output of the country, now estimated at 200,000,000 tons per annum. We know that the Clean Air Act will reduce the demand for coal in its present form in many places, but it must be—and indeed is—the urgent aim of all connected with coal, to provide suitable alternative forms of fuel derived from coal to meet the demand of the new clean air zones.

Some users, for instance British Railways, are bound to be a progressively declining market in the immediate future, due to the use of diesel locomotives, but it is hoped that in many areas this old-established customer of the coal industry will return through an extension of the railway electrification programme.

It was considered by many that there was a real possibility of meeting some of the competition by the production of oil from coal, and the need to explore this matter was recognized by the setting up of the Wilson Committee on Coal Derivatives in 1959. In the most important report produced by this committee last year, their considered opinion was that the prospect of making oil from coal in this country was remote under the present processes. There was thought to be much more promise through the medium of coal gasification, and this committee advised that the question of the production of oil from coal should be reviewed immediately there was a substantial advance in coal gasification.

The committee envisaged that carbonization would remain the most important method of processing coal, and that the amount of coal carbonized was likely to remain fairly constant.

If we accept that this avenue of competing on a similar front with the oil industry is closed, at least for the time being, we must turn to the problem which this decision brings; namely, the need to raise the efficiency of the mining industry to the highest possible level. There has been a steady resurgence of effort towards this end, and the results in the past few years, based on face and overall O.M.S., have shown considerable success. This is apparent from the following table, and on this basis, the industry in Great Britain has reached a peak figure for all time.

Recent Trend of O.M.S.

Year	*Face O.M.S.*	*Overall O.M.S.*
1957	68.9 cwt.	24.6 cwt.
1958	70.4 cwt.	25.3 cwt.
1959	74.6 cwt.	26.6 cwt.
1960 (Jan./Sept.)	78.9 cwt.	27.8 cwt.

If, however, our industry is to meet the competition from other forms of energy production successfully, there must be a continual upward progress in efficiency. The Revised Plan for Coal sets out to reach an overall O.M.S. for the country of 30 cwt. by 1965. There are many in the industry who consider that this will not be a sufficient improvement, and that still higher production efficiency must be attained, possibly by the use of methods of coal-getting and handling not envisaged or even discovered today.

The principle of operating face equipment for as many hours as possible each day is becoming more and more important when one takes into account the expensive machinery now tied up in a coal-face, and also the tendency for the working time actually spent at the coal-face to grow even shorter.

Apart from the actual power-loading unit, much is expected from the recently developed powered supports which, where they can be applied, will give a considerable uplift to face efficiency. Under ideal conditions, they open the way to real continuous mining on longwall faces, and leave only the making of the gate-roads to absorb unproductive manpower. Retreat mining with the first drivages of the roads done by mechanized equipment is a solution in suitable conditions, and the use of scrapers may assist in building better roadside packs with less manpower, but there appears to be a vital need to carry out research work into improving methods of dealing with the debris from the end-roads.

We have, of course, to take the next step towards the "manless face", and several most promising experiments are under way which must be given every encouragement.

In the remarks above, normal mining conditions have been assumed, and there will always be those cases where gradients, thinness of seam, abnormal faulting, difficult roof or floor, make it virtually impossible to go all the way with mechanical mining.

These circumstances may make it most difficult to justify working certain seams at all if conventional mining methods have to be used, as the advantages to be obtained by the full use of mechanization are most substantial.

It is remarkable how the gradient problem at least has been overcome. In a recent visit to Germany to investigate the use of panzer conveyors on gradients of about 1 in 2, it was found that the steep measures did not result in a compulsory shortening of the conveyor runs.

Seams lying on gradients of 1 in 2 were inspected, and in one case, with a 5 -ft. thick coal, a face had been laid out using an Anbauhobel and armoured flexible conveyor. The total length of the face was 240 yd., and the layout gave excellent results. It coaled on two shifts, advancing 10 ft. per day and produced over 1,000 tons of run-of-mine coal with a 47 per cent discard. On the saleable yield of 700 tons per day, a face O.M.S. of 9.8 tons was achieved.

The conveyors were said to operate most successfully on the steep gradients—up to 220 yd. long the practice was to use a single motor drive at each end. Where the faces were longer, up to 260 yd., a third motor was added.

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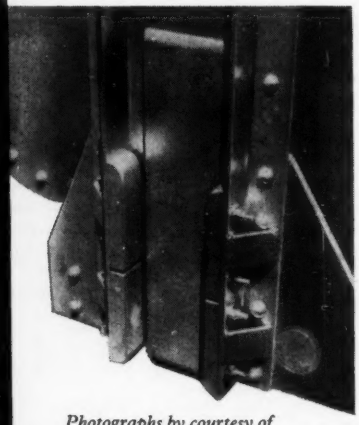

Photographs by courtesy of Wabi Iron Works Ltd, Ontario show how guide shoes were fitted.

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In another case, in a 3 ft. 8-in. seam on a gradient of about 1 in 1.5, a 200-yd. fully mechanized shearer face was seen producing 677 tons per day on two coaling shifts with a daily advance of 10 ft. 6 in.

Underground Transport

It follows that if one is dealing with daily outputs of 1,000 tons per day and upwards from an individual face, there must be a most effective haulage layout if the advantages of concentration of output are not to be lost.

It is not proposed to go into the relative merits of "all conveyor" and "locomotive haulage" mines, except to say that when bulk output is planned and achieved, then it it possible to justify a substantially greater capital outlay on the haulage facilities for a district.

Again, individual circumstances must be taken into account, depending for instance on whether the layout is a horizon one or not.

Where the main roadways are in the seam, and where the gradient is appreciable, the fact that cable-belt conveyors are now available to carry large tonnages over long distances has revolutionized the haulage problem in many cases. The first expense is heavy, but the benefits resulting from the use of such a conveyor, well installed and carefully maintained, can be very rewarding, particularly in the saving of manpower.

In horizon-mining schemes, there is always the need to establish the maximum amount of coal which can be transported on each cross-cut and lateral, and in this connection some figures which were obtained from Germany and Holland on a recent investigation may be of interest.

It was found that the maximum concentration of coal which was planned to be taken from one crosscut was about 1,500 tons per shift, using mine cars and locomotives, and that tonnages of 1,000 to 1,250 tons per shift were common.

It was also found that two loading points were permissible on one cross-cut, provided there was a distance between them sufficient to hold three trainlengths of mine cars under the best conditions. In adverse conditions, for example, where roadway maintenance was difficult, it might be necessary to have space for four or even five trains between the loading point.

Another aspect of transport which can squander labour is in the handling of materials. There has long been a need for an efficient method of taking in necessary materials alongside gate-road conveyors, or in the end-roads, and a number of most ingenious devices have been adopted; for example, the suspended carrier rope, or the floor-mounted or suspended Mono-rail.

A very recent development has been to design a supplies vehicle which is capable of carrying a load of 1 ton over the normal mining roadways up to gradients of 1 in 4. These units run on pneumatic tyres and are powered by diesel engines, and are so designed that their width (3 ft. 3 in.) enables them to run in the space normally available alongside a gate conveyor. In addition to the load which can be carried on the vehicle itself, it is claimed that it can tow on level roadways a weight of 15 tons.

A very high degree of manoeuvrability and flexibility can be achieved by the use of such a machine and a most important contribution to "elsewhere underground" efficiency obtained. The application of these machines, which are expensive in first cost, can be justified in districts where a high degree of bulk output concentration has been achieved.

One major advantage which follows the concentration of output at as few places as possible in a colliery, is that it is simpler to allocate the men. This can be considered in several stages, and it is probably logical to deal first with the need to ensure that too many men are not employed on any one job. Method study, which brings scientific analysis to what was done in the old days by rule of thumb or past experience, can be of very great assistance.

Having achieved a degree of output concentration at the faces, it is usually easier to justify the installation of mechanical aids at loading and transfer points which will ensure that, as far as possible, every man is given a full day's work, from the time element sense.

On loading points, a great deal of work has been done, possibly in recent times more with the aim of minimizing breakage of coal. Many excellent designs are to be seen which deal with high tonnages of up to 3,000 tons per shift with a minimum of manpower, and this is a fundamental requirement when the concentration of output is being planned.

Similarly with the handling of materials. Method study can be used most effectively and bulk output can again justify the use of adequate mechanical aids at limited points.

Most colliery managements now use some form of manpower deployment record, whereby it is possible to see, on a chart or board, the exact position of every worker very shortly after the beginning of a shift. Such a system also greatly assists the officials responsible for deploying the men at the commencement of a shift, to ensure that the right persons are withdrawn from their usual place of work to replace absentees, with as little delay as possible. This process is made more than ever essential when production has been concentrated on a smaller number of faces.

A point which will, of course, be brought out by method study, is the need to avoid any delay in the men reaching the working face—manriding is an essential feature and large production units again mean that full teams must be transported with as little hold up as possible. This makes the use of manpower deployment charts vital, as otherwise complete districts could well be held up till absentees' places were filled.

Colliery Organization

There is a growing realization that the management chart of one of the large new collieries with a high degree of mechanization and concentration calls for the very best type of official. The problems arising at a colliery producing four, five or six thousand tons per day are quite different from the smaller pits with which we have been more familiar.

Most of these collieries will wind coal on at least two shifts, and there will be general agreement that the status of the underground official in charge of the two shifts, other than dayshift, calls for some attention. Already a number of appointments have been made on the second coal production shift of men holding First Class Certificates, and this practice must be extended, without, of course, taking away from the overriding authority of the Manager or Agent/Manager.

The services provided by the engineers and electricians of the mines will play an increasingly important part in the drive to improve face and overall efficiency. In Great Britain, the principle of planned maintenance has now been generally adopted, and, with the setting up of Area Central Workshops throughout the country, planned withdrawal of equipment has now become a practical reality.

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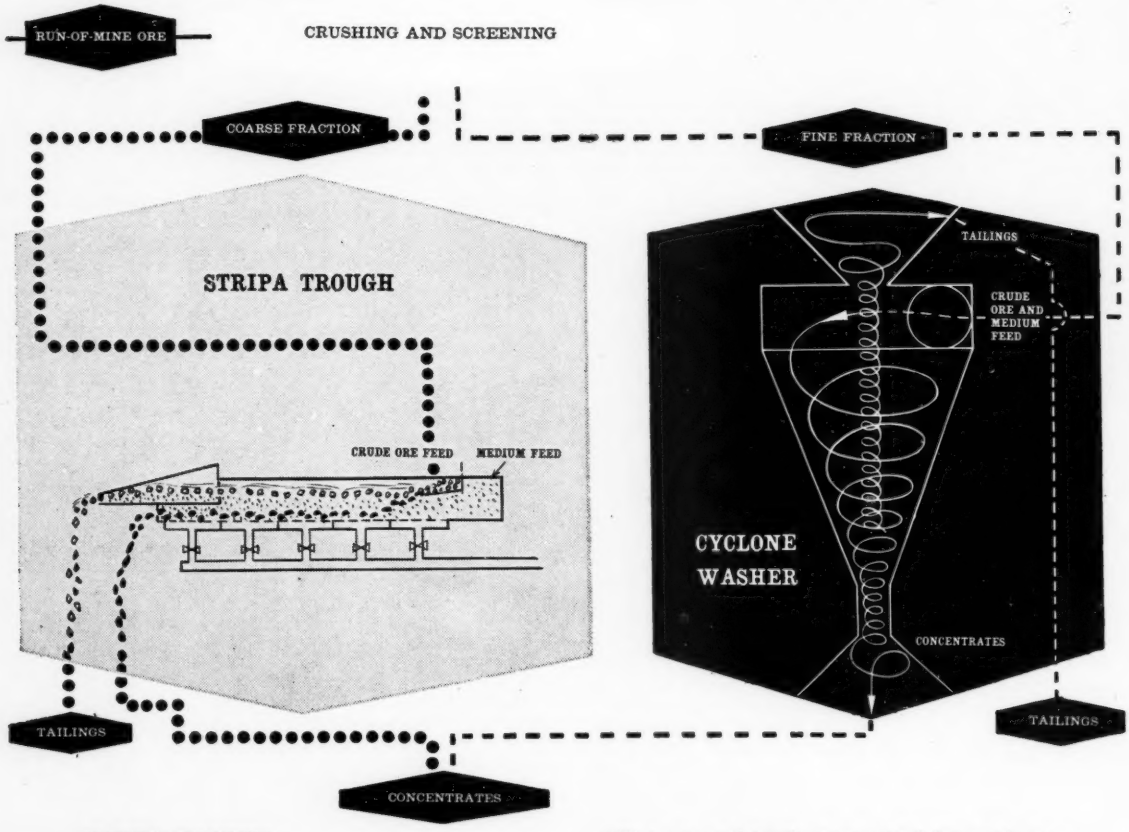

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The Future of Nuclear Power

IN March, 1957, the U.K. Government announced a programme for nuclear power under which 5,000-6,000 mW. of nuclear generating capacity was to be installed by the end of 1965. A White Paper issued in June, 1960, said that the programme had been revised to "about 5,000 mW. in 1968". Also in 1957, the "three wise men" of Euratom proposed the installation in the six countries of the European Community of 15,000 mW of nuclear generating capacity by 1967. The capacity which will actually be operating in these countries by that date seems likely to fall far short of the 15,000 mW. proposed.

The reasons for the downward revision of earlier appraisals are examined by Sir Friston How, C.B. in the December, 1960 issue of *Optima,* the quarterly review published by the Anglo American Corporation. The author, who was secretary of the Atomic Energy Office from 1954 until his retirement in 1959, goes on to discuss the prospects for nuclear power. His observations are based mainly on experience and prospects in the U.K.

The original estimate made in the U.K. was that the cost of electricity sent out from the first of the commercial nuclear power stations would be about 0.6d. per kWh., and that this would be about the same as the cost from a new coal fired station. It seemed that the shortage of indigenous coal, with a rising price trend, which was expected at that time, and a reduction in the capital cost per kWh. of capacity, as successive nuclear power stations were designed and built, would soon make nuclear generation highly competitive.

Two economic factors of a general character intervened, however, one being a general inflationary rise in prices of about 10 per cent., and the other an increase in the rate of interest on capital which has to be paid by public utilities in the U.K. The effect has been to add rather more than 0.1d. per kWh. to the estimated cost of electricity from a nuclear station, but rather less to that from a coal-fired station. Of much greater consequence, however, is the transformation in the competitive power of the fossil fuels. A surplus of coal has led to critical situations in the U.K. and on the Continent, and much oil tanker capacity is lying idle. Moreover, there has been a marked reduction in the cost of electricity from new coal-fired stations. Development of larger generating sets has reduced the capital cost, which in the U.K. four or five years ago was about £70 per kW. of capacity, and it is now expected that new stations will cost £40 or even less per kWh. Furthermore, their efficiency will be increased by operation at higher steam temperatures and pressures.

The most recent estimates of the cost of electricity from Berkeley and Bradwell, the first nuclear stations that will have the production of electricity as their primary purpose, are respectively 0.86d. and 0.81d. per kWh. Apart from the probable trend in the price of uranium which, as the article states, is likely to be downward, the two main directions in which nuclear power's competitive position can be improved are reducing the capital cost of the station per kW. of installed capacity, and by more efficient utilization of the fuel. It is estimated that for the latest station now under construction, the capital cost per kW. of capacity will be between £120 and £130, as compared with about £160 for Berkeley and Bradwell, and that electricity sent out from this station may cost 0.65d. to 0.7d. per kWh. Stations now being ordered should show a further substantial improvement.

As regards better utilization of the fuel, the view is expressed that some improvements in the economics of the immediate descendants of Calder Hall can be expected, but it is pointed out that for greater reductions in cost there must be development of a more fundamental kind. This is to be found in the advanced gas-cooled reactor which, while using graphite and carbon dioxide as moderator and coolant, will use slightly enriched uranium in the form of oxide, sheathed in stainless steel or beryllium, instead of natural uranium metal sheathed in magnesium alloy. A large-scale reactor experiment, which is now being built in Cumberland, should be operating by the autumn of 1961. It is estimated that electricity sent out from a full-scale commercial power station of this type should cost around 0.5d. per kWh.

Further along the road which started from Calder Hall lies the high temperature gas-cooled reactor. This is being studied by 12 of the O.E.E.C. countries, under the auspices of the European Nuclear Energy Agency, as a joint project intended to lead to the construction of an experimental reactor at Winfrith Heath in Dorset. This reactor, while still using gas (probably helium) under pressure as the coolant, will dispense with metal sheathing of the fuel elements, using instead highly enriched fuel in ceramic forms dispersed in a graphite moderator. This system should produce a temperature in the outlet gas of about 750 deg. C., giving an efficiency of conversion of heat to electricity of about 40 per cent.

Many other combinations of fuel, moderator and coolant are possible and those which appear to be the most promising are being examined in various countries. One of the two main lines of attack is to try to lower capital costs per kW of capacity by using enriched fuel. The other aims at improved utilization of fuel as well as reduced capital costs, the eventual goal being a situation where net fuel consumption is negligible, as in the fast breeder reactor.

How soon the atom will become competitive with power from other sources will depend on local circumstances and will vary from country to country and, within the larger countries, from place to place. The necessary conditions, as Sir Friston How points out, are conspicuously present in the U.K. and it remains probable that nuclear power will become economic in this country as soon as anywhere in the world.

The White Paper of June, 1960, said the British Government was advised "that nuclear generation for base-low purposes is likely to become cheaper than conventional generation by about 1970". The point of economic competitiveness may be reached about the same time in some other European countries, as well as in other parts of the world, such as Japan, where conditions are particularly favourable.

Eventually, the most far-reaching effect of nuclear power may be to open up territories which are now relatively undeveloped, industrially and agriculturally, because they lack power in adequate quantity and at a reasonable price. Where cost is of no importance small power-producing reactors can certainly be constructed, since they provide power for the U.S. nuclear submarines and the Soviet icebreaker. Much remains to be done, however, before a small reactor, perhaps of 10-30 mW., has been developed to provide power which would be economic at any rate in relation to local conditions.

Whereas the present world demand for energy consumes annually about 2,000,000,000 tons of coal or its equivalent, it has been calculated that by the end of the present century the requirement will have risen to some 7-8,000,000,000 tons. It is evident, therefore that a new source of power will be needed. The future of nuclear power is not in doubt; its timing is uncertain.

Nickel's Early Days

The part played by International Nickel of Canada in pioneering the world's nickel industry and the way that company became by far the world's largest producer is told in a book entitled *For The Years To Come* written by John F. Thompson and Norman Beasley and recently published by G. P. Putnam's Sons, New York, and Longmans, Green and Co., Toronto. Pp. 374, $5.00. One of the co-authors, Dr. John F. Thompson, was identified with the company from 1906 until last year, when he became honorary chairman, and he still continues as Chairman of the Executive Committee and a member of the Advisory Committee

INTERNATIONAL NICKEL CO. was incorporated on March 29, 1902, under the laws of the State of New Jersey with an authorized capital of $24,000,000 as a holding company in respect of seven existing companies, including the Canadian Copper Co., which owned substantial nickel-copper ore deposits in the Sudbury District of Ontario, Canada, and the Orford Copper Co. which had no ore deposits but had developed an efficient method of refining such ores. Thenceforth, real progress began to be made in research into the properties and uses of the Canadian ores, attention being focused on better ways for producing nickel and for the recovery of the other metals in the ore, particularly the platinum metals. Monel nickel-copper alloy was developed and in the early years of the 20th century further advances were made in alloy steels.

On September 5, 1912, International Nickel Co. was reorganized.

With an authorized capital of $62,000,000 it ceased being a holding company and became an operating company, taking over the assets and liabilities of companies brought into the original consolidation. On July 25, 1916, following the outbreak of the First World War, The International Nickel Co. of Canada Ltd., a subsidiary, was incorporated under the Dominion Companies Act and its Port Colborne, Ont. refinery went into operation in 1918, all assets of the enterprise in Canada then being transferred to The International Nickel Co. of Canada Ltd.

In the post-war years, nickel sales fell from 35,677 s.tons in 1918 to 6,402 s.tons in 1922. In the meantime Robert C. Stanley had set about extending further the use of nickel in already established civilian markets and developing new uses for nickel. Though funds were low, $3,000,000 were spent on a sheet and rod mill for rolling Monel alloy at Huntington, W.Va., where Monel refining became concentrated. At the same time, the Bayonne works were closed down and nickel refining was concentrated at Port Colborne. Stanley became President of International Nickel in March, 1922, and soon after organized the Development and Research Department, insisting on a sales and advertising programme for the Monel alloy, sales of which so far had been very slow.

Whereas in 1918, the commercial uses for heat-resistant and electrical chrome-nickel-iron alloys were limited, by 1926, these alloys were accounting for more than 1,000 s.tons of Inco nickel each year in the U.S. and Canada, and by 1928 total sales of nickel had reached 38,151 s.tons. In that year, The International Nickel Co. of Canada Ltd. became the parent company and the U.S. company a subsidiary.

On January 1, 1929, The International Nickel Co. of Canada Ltd. acquired the Mond Nickel Co., of London, England, principally to work the Frood Mine, which contained an enormous tonnage of unusually rich copper-nickel ore, part of which was owned by both companies. Also involved in the fusion were the Mond Nickel Co.'s Garson and Levack mines, their smelter at Coniston, a nickel refinery in Clydach, Wales, a precious metal refinery at Acton and Henry Wiggin and Co. Ltd., operating rolling mills, fabricating and chemical plants in Birmingham.

Under single ownership, more than 70,000,000 tons of ore have been mined by open-pit methods at the Frood mine and as a result of the merger Inco had proved ore reserves totalling 202,620,000 s.tons.

It was in 1931 that John F. Thompson succeeded J. L. Agnew as Vice-President of Inco. Among other things, Agnew had set up the Geological Department, which, later, was to discover the Manitoba deposits.

After a shrinkage in the world's nickel business to 28,500 tons in 1932, following the depression of 1929, Inco sales again reached a new peak in 1935. Meanwhile, among the many developments at Inco during the 1930s was an alloy marketed under the trade name of "K" Monel, which incorporated nickel-copper plus aluminium plus titanium, and this was followed by extensive improvements in existing alloys and the development of new ones as well as the great advance in stainless steels. In respect of the copper side of the business over $52,000,000 was spent on plant and mine modernization. Millions of dollars were also appropriated for laboratory and plant improvements and for the acquisition of Monel-Weir Ltd., in England, and the Ontario Refining Co. Ltd., operators of the largest copper refinery in the British Commonwealth.

During this period, too, the electrolytic nickel process at Port Colborne was making possible the more complete recovery of the platinum metals, gold and silver.

During World War II, Inco almost doubled its output of ore, supplying the Allies with 750,000 s.tons of nickel, 900,000 s.tons of copper, 1,800,000 oz. of platinum metals, 12,900,000 oz. of silver and 425,000 oz. of gold. At the end of the war, the company received $20,000,000 for its interests in the Finnish Petsamo mines from the Russian Government.

Because "the pincers of war had clawed deep into the company's ore reserves", fresh prospecting was carried out, often with airborne electromagnetic equipment. Inco began ground prospecting in Manitoba in 1946 with aerial supply support and, after ten years, a development programme in the Thompson-Mystery-Moak Lake area at an estimated initial cost of $175,000,000 was announced. The completion of the Thompson project in 1961 will provide the company with an initial capacity for a further 37,500 s.tons of nickel each year, bringing the total annual production to more than 192,500 s.tons.

Meanwhile, recent improvements in production procedures, reorganized marketing and distribution activities and more intensified research in respect of both process and product, are expected to contribute to the continued growth of the company.

Machinery and Equipment

Solid Bowl Continuous Centrifuge

The Dynocone solid bowl continuous centrifuge manufactured by International Combustion Products Ltd. is a machine of British design and construction for the separation of solids from liquid suspensions and for hydraulic classification. Operating on the principles of separation embodied in the original patents taken out in the U.S. by W. E. Laughlin, the Dynocone has an entirely new drive and controls. The drive of the Dynocone is patented in the United Kingdom and principal countries throughout the world.

The Dynocone consists essentially of a horizontal revolving shell or bowl, cylindrical and frusto-conical, or frusto-conical in form, inside which a screw conveyor of similar section rotates in the same direction at a slightly higher speed. The feed, which must have a fluid consistency, is admitted to the bowl through the centre tube of the revolving screw conveyor. On leaving the feed pipe the slurry is immediately subjected to a high centrifugal force causing the solids to settle on the inner surface of the bowl at a rate which depends upon the rotational speed employed. The liquid, meanwhile, assumes the appearance of a solid of revolution, the surface of which is cylindrical.

When the liquid reaches a predetermined level, it overflows through the discharge ports at the larger end of the bowl. The separated solids are conveyed out of the liquid and discharged through outlets at the smaller end of the bowl. The solids are continuously dewatered by centrifugal force as they proceed from the liquid zone to the discharge. Excess entrained liquor drains away through the particle bed circumferentially to the "pond". Provision is made for the solids to be washed after leaving the liquid and before discharge; the wash liquor travels back to the liquid zone and leaves the machine with the main liquor.

The method of driving and controlling the Dynocone eliminates gear failures. Since the screw and the bowl are not geared directly together and driven by a common motor, the high screwing torque developed in the case of an overload is not transmitted to the gears at great speeds. The overload is controlled or immediately and effectively removed.

The bowl of the Dynocone is belt driven by a main motor. The screw conveyor is carried on the output shaft of a planetary gear box rotating with the bowl, and the input shaft of this box is belt-coupled to another smaller conveyor control motor. This arrangement permits the control of relative speeds between the bowl and conveyor, as well as variability of bowl speed.

The differential speed between the bowl and conveyor is a critical factor in the efficient dewatering of many materials. It is manifestly important, therefore, that this speed can be altered, and it can easily be done on the Dynocone by fitting pulleys of pre-determined sizes. This method is particularly valuable as the precise operating differential for a material cannot always be determined by short period tests but only after the machine has been installed. The use of high differential speeds to obtain maximum output of solids is limited only in the handling of abrasive materials, where consideration of conveyor wear makes it advisable to keep the differential speed low.

Operations include the separation of crystals from magmas, separation of fine precipitates, fine coal dewatering and hydraulic classification.

The machines are designated in accordance with the bowl's diameter and its length as follows; 612: Capacity up to 100 gph. liquid, and 400 lbs./hr. solids; 1,840: Capacity up to 2,200 gph. liquid, and 4,500 lbs./hr. solids; 2,424: Capacity up to 1,500 gph. liquid, and 3,000 lbs./hr. solids; 3,060: Capacity up to 9,000 gph. liquid, and 12 tons/hr. solids; 4,080: Capacity up to 25 tons/hr.

PORTABLE COMPRESSORS

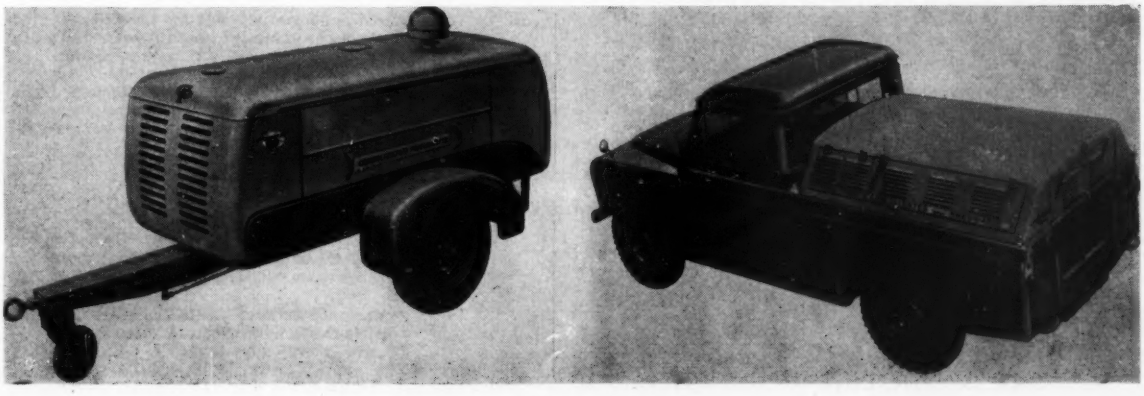
A new brochure, describing the manufacturers' full range of oil flooded rotary portable Power Vane compressors, has been issued by the Consolidated Pneumatic Tool Co. Ltd. The first section describes the operating principles, design features and constructional details of the range, this being followed by a section in which specifications and illustrations are given of units in the range from 125 c.f.m., to 600 c.f.m. capacity. Of particular note are the details of the new 125 and 260 c.f.m. models which the company has recently introduced in addition to a Land Rover mounted unit.

A new streamlined canopy and a towbar support are amongst the features of the new version of the 125 c.f.m. This new model has greater visual appeal than the older version which it supersedes and the new canopy provides easy access to the engine and compressor. The basic compressor design is unchanged, this consisting of two eccentric vane-type compression stages being mounted in line with the engine, positive alignment of the engine and the first stage compression casing being by a tandem piece with a further tandem piece separating the two compression stages.

The compressor is powered by a four stroke, four cylinder Ford 592E water cooled direct injection diesel engine which develops 47 B.H.P. at a governed speed of 1,800 r.p.m., on a continuous 12 hour rating. The cylinder bore is 3.937 in. and the stroke is 4.526 in. The compression ratio is 16:1. The fuel pump is series SPE-A multi-cylinder Simms unit, and the injection nozzles are of the four hole type. Combustion chambers are located in the heads of the pistons which are of die cast aluminium alloy, tin plated. A 12 volt electric starting system is employed. The overall length of the compressor including the towbar is 12 ft. 5 in., the width being 5 ft. 1 in. and the height 5 ft. 7½ in. The net weight, dry, is 3,192 lb.

A Land Rover mounted version of the model 125-RO-2 compressor is for highly mobile operation and for use on sites where no access roads exist. For the time being availability of this new unit is restricted to the U.K.

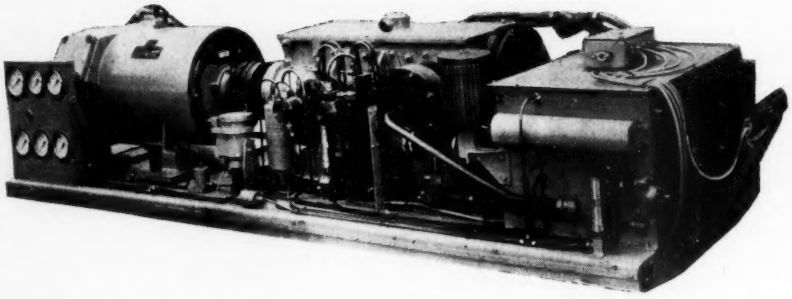
The compressor, a standard two stage, sliding vane delivering 120 c.f.m., at 100 p.s.i., is mounted centrally along the length of the body of the 109 in. Land Rover. The Rover diesel is a four stroke, four cylinder overhead valve engine of two litres capacity which de-



C.P. Tool compressor equipment. At left, below, the new C.P. 125-RO-2 rotary Power Vane compressor. At right, Land Rover mounting for Rotary Vane Compressor

This is the

ARMSTRONG AIRBREAKER COMPRESSOR . . . .



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The Armstrong Airbreaker system represents a modern and versatile method with which coal can be prepared for loading operations. The system can be applied to mines using Longwall or Pillar and Stall working and is equally effective in cut or uncut coal.

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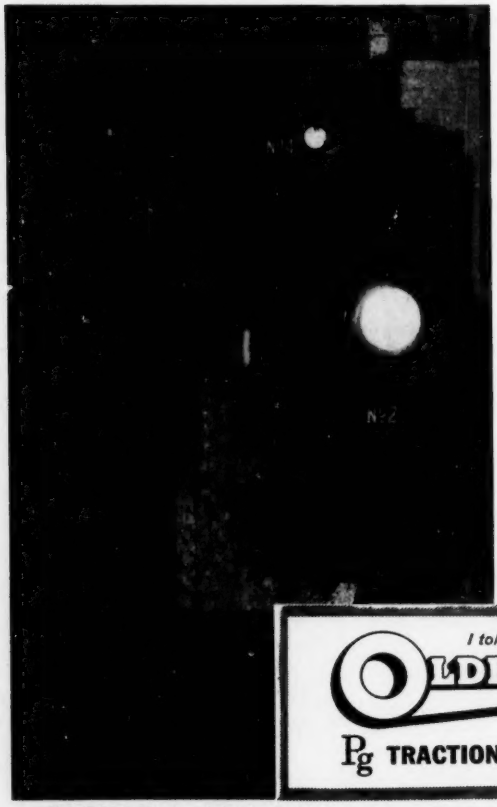

Pg*

MEANS CHEAPER HAULAGE — LONGER SHIFTS

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Until now, many mines have been unable to take full advantage of battery-electric haulage. Today, since the introduction of the greatly advanced Oldham Pg battery, they have gained the double benefit of cheaper haulage and longer battery shifts.

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LONGER LIFE The Pg plate incorporates woven glass fibre sleeves, into which the active material becomes firmly embedded, completely eliminating 'shedding.' In addition, physical working stresses are absorbed by the exclusive Pg outer plastic sleeve. These two factors both contribute to the very long working life of the Oldham Pg battery. If you are facing a haulage problem now, or anticipate one, ring or write to us and arrange for an Oldham consultant to call and discuss how Pg can help you.

Pg CAP LAMP BATTERY The advantages of Pg have been applied to the Oldham Cap lamp. In addition to improved efficiency and longer life Pg means *safer* working, as it gives the wearer brighter light at the end of the shift, when accidents are more likely to occur through fatigue.

* **Pg also means PLASTIC plus GLASS, the first and only double-sleeve tubular battery plate.**

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Pg TRACTION BATTERIES

OLDHAM & SON LIMITED · DENTON · MANCHESTER · TELEPHONE DENTON 2431

velops 51.2 B.H.P. at 3,500 r.p.m. and 44.2 B.H.P. at 2,700 r.p.m. Cylinder bore and stroke are 3¼ in. and 3½ in. respectively and the compression ratio is 22.5:1.

The drive from the engine is taken through the gearbox to the centre power takeoff and thence by an outrigger extension shaft to a multiple vee rope pulley. This pulley connects by a 1.125:1 reduction drive to a pulley mounted on an extension shaft of the compressor. The compressor is driven with the engine in 3rd gear at 2,700 r.p.m., the take-off shaft rotating at 1,960 r.p.m. and the compressor shaft at 1,740 r.p.m. The wheel base of the Land Rover is 109 in., track being 51½ in. Ground clearance is 9¼ in. and the overall length and width are 175 in. and 64 in. respectively. The total weight, including 300 lb. of tools and crew of three is 5,900 lb.

LOADING IN THIN SEAMS

Experience obtained from previous installations demonstrated the need for a British built Joy loader suitable for British conditions, with their thin variable seams and close timbering. In 1956 the first British built machine of this type was manufactured. In the following four years over 100 machines were delivered to collieries in the National Coal Board.

The Joy 12 BU Loader is a mobile machine designed to load continuously, prepared material in thin seams. It consists of a gathering head on which are mounted two alternately operating arms, which sweep the material onto a central chain conveyor. This carries the load through the length of the machine to deliver it onto convevor or into tub or shuttle car. Stragetically located jacks control the movement of the gathering head to allow operation of the machine in undulating seams and provide horizontal and vertical movement of the rear conveyor to give accurate discharge into the transportation system. The whole is mounted on a chassis, carrying two independently driven caterpillar tracks, which give a high degree of manoeuvrability and flexibility.

The machine height of 28½ in. and the overall width of 56 in. allows its operation in thin seams with close timbering and a loading rate of up to 1½ tons per min. in coal is possible. The applications in Britain to which this versatile machine has been applied, include bord and pillar mining, both in whole and broken work, development in coal, in coal and stone, and in stone, roadway enlargement, and other applications.

A.E.I. IN 1960

During 1960 Associated Electrical Industries (Rugby) Ltd. maintained their tradition of service to the mining industry.

Orders for mine winders, valued at more than £1.000,000 were received by Heavy Plant Division during the year—from gold mining companies in Africa as well as from the N.C.B. One of the largest orders, from the General Mining and Finance Corporation, was for two 5,200 h.p. twin-motor a.c. geared winders for Buffelsfontein.

Of the U.K. orders, the most substantial is for two double-drum winders, driven by d.c. motors each rated at 2,850 h.p., for Bedwas Colliery, South Wales. The supply for each motor will be provided by a steel tank mercury arc rectifier/inverter unit rated at 1,900 kW., 800-0-800 v. The Division has received many other orders for winders of varying types from the N.C.B.

One of the largest orders for a d.c. winder was for the South African gold mining industry. The Union Corporation of South Africa gave instructions for the manufacture of a twin motor winder with Ward Leonard control. Each of the motors will be of 2,250 h.p. The N.C.B. has ordered a winder with Ward Leonard control for No. 4 Shaft at Manton Colliery, in No. 1 Area of the North-eastern Division. This will be a 2,800 h.p. tower mounted friction winder.

During the year winders were commissioned in Great Britain and Africa. A four rope tower mounted friction winder rated at 4,200 h.p. r.m.s. (8,400 h.p. peak) was commissioned by the Anglo American Corporation in No. 2 Shaft at Mindola, Southern Rhodesia. Automatic control is available for winding ore; otherwise manual control is used. Many a.c. and d.c. winders were put into service in Great Britain.

Among d.c. winder installations, one of the year's outstanding events was the commissioning of the 9,000 h.p. winder in No. 3 Shaft at Mosley Common. The first African winder supplied by grid-controlled mercury-arc rectifier and, it is believed, the world's first underground winder equipped with mercury arc inverters (rated 816 kW., 800-0-800 v.), was commissioned by Gold Fields of South Africa Ltd. in the 2b Tertiary Shaft at Venterspost. This 1,200 h.p. winder is installed at 6,000 ft.

In Britain, the eighth AEI winder supplied by mercury-arc rectifier was commissioned at Whitwell No. 1 Colliery. This 1,250 h.p. drum winder is designed for raising coal from a depth of 973 ft. The last of three winders supplied by Heavy Plant Division to Rothes Colliery was put into service.

Heavy Plant Division report a continued demand for large synchronous machines for mining application from U.K. collieries.

So far as auxiliary equipment is concerned, Cable Belt Ltd. ordered from Motor and Control Gear Division a 500 h.p. flameproof squirrel-cage motor, control gear, and auxiliary equipment for a cable belt drive which has now been installed at the N.C.B., Calverton Colliery, East Midlands No. 6 Area. New orders from the N.C.B. include one for seventy-six squirrel-cage motors from ¼ to 60 h.p. for installation at a new washery plant at the N.C.B., Parkside Colliery.

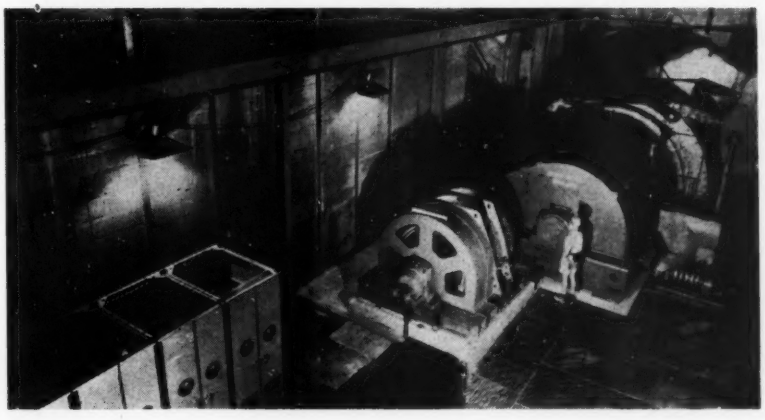
The steady demand continues from overseas mining territories for AEI electrical equipment. For example, Motor and Control Gear Division has received through AEI (India) Pvt., Ltd., Calcutta Office, new business valued at £27,500 covering the supply of nine 100 h.p., flameproof squirrel cage motors, starters, drum controllers, and switch pillars required by Singareni Collieries Ltd., Deccan, India, for underground haulage duty. Carron Co., of Falkirk, are supplying the haulages through George Miller Ltd., their agents in India. A separate order valued at £25,000 covering twenty eight flameproof motors, control gear, and switchgear, was received from J. Tinsley & Co. Ltd. This equipment is also required for haulage duty by Singareni Collieries Ltd.

For driving hoist equipment for a coal mine in South Korea, the General Services Administration in the U.S.A. has ordered four induction motors from 20 to 50 h.p. control gear, and the mechanical parts of the hoist, which will be supplied by M. B. Wild & Co. Ltd. The AEI agents, Paterson, Simons & Ewart Ltd., have placed business for similar electrical equipment also required for South Korea. Machinoimport of Moscow, who are import agents, have ordered three 75 h.p. flameproof motors and control gear for driving Airdox compressors at the coal face of a Russian mine.

Selection Trust Ltd. have ordered twelve squirrel-cage motors from 50 to 125 h.p., for the Mufulira Copper Mines Ltd., in Northern Rhodesia. These motors will be associated with a secondary crushing and concentrator plant and will be mainly for dual motor conveyor drives.

During the year, three large compressors rated at 25,000 cu. ft. of air per minute, at a discharge pressure of 100 lb./in.²g., have been completed for the Anglo American Corporation of South Africa Ltd., for installation at the Western Deep Levels and Vaal Reefs gold mines.

Believed to be the first underground winder with mercury arc inverters (rated 816 kW., 800-0-800 volts), this A.E.I. 1,200 h.p. winder was commissioned by Gold Fields of South Africa Ltd. It operates 6,000 ft. underground in the 2b Tertiary Shaft at Venterspost



MINING MISCELLANY

The discovery new high-grade uranium ore body is reported from Rum Jungle, in Australia's Northern Territory, with reserves estimated to be at least comparable with the total mined to date from other deposits at Rum Jungle. (The Atomic Energy Commission has not released actual figures from Rum Jungle's first two open cuts, but it is known that millions of tons of ore were lifted and returns are reported to have been very rich).

★

Japan will import 1,000,000 tons of coal from a New South Wales coal mining company, Clintons Nattai Collieries, in the next five years. This contract is additional to coal orders for Japan already received. The new contract had been signed with the Fuji Iron and Steel Co., and the coal will be mined in the Burragorang Valley, southwest of Sydney.

★

The consulting geologist to Great Whale Iron Mines of Canada reports that three magnetite iron deposits on the company's Hudson Bay iron ore properties contain an estimated 942,000,000 l.tons of concentrating ore, recoverable by open-pit methods, and capable of yielding about 383,000,000 l.tons of high-grade iron averaging about 67 per cent. The deposits are located on three concessions covering some 195 sq. miles, about 50 miles south east of Great Whale River on the east of Hudson Bay in New Quebec. Drilling is expected to increase the tonnage figures. Great Whale Iron Mines is owned in equal parts by Belcher Mining Corporation, Wright-Hargreaves Mines, and Malartic Gold Fields, in all of which Little Long Lac Gold Mines has interests.

★

American steel companies plant to cut 1961 expenditures for new plant and equipment to $1,200,000,000 (1.2 billion), about 19 per cent less than 1960 outlays. The American Iron and Steel Institute reports that $1,500,000,000 in 1960 was 7.5 per cent short of the industry's target, but it was still the second highest on record, surpassed only in 1957.

★

The Haifa Technion, Israel Institute of Technology has established, with support from the government, a special department of mineral engineering where undergraduates, will being trained in prospecting methods, mining operations and ore dressing. A post-graduate department has been teaching engineering geology and mineralogy since 1956.

★

The Turkish Ministry of Industry has confirmed that negotiations have begun with the Reynolds group regarding establishment of a $25,000,000 aluminium industry in Turkey. Ample hydro-electric power is stated to be available for processing the country's substantial bauxite deposits.

★

Construction cost of the Eregli iron and steel works project in Turkey is estimated to total $250,000,000, of which $100,000,000 is expected to come from the Development Loan Fund as a long-term credit, a further $50,000,000 might be provided from private U.S. sources, and it is hoped that European firms might participate to the extent of pro viding machinery and equipment on long-term credit. A substantial sum, estimated at about T.L.800,000,000 would have to be found from Turkish sources, and the Bank of Turkey is reported to be concerned in this aspect of the investment.

★

The Swedish firm, Nordstroems Linbanor, A.B., has announced that it has been commissioned to build the transport and unloading installations at Lower Buchanan in Liberia, the port which ships iron ore from the Nimba Mountain deposits. Construction will start in the first half of 1962, and the new installations should be ready for use by mid-March 1963. The contract is worth some 26,000,000 Kr. Railway trucks will transport the ore about 300 kilometres to the coast. The 90 ton trucks will be automatically tipped at the rate of 70 per hour, thus achieving a loading capacity of 6,000 tons per hour.

★

The strike in Bolivia's nationalized tin mines, which began on January 18, ended three days later, on the understanding that the workers would be paid their wages. Alleged non-payment of wages caused the strike, and production thus lost is valued at an estimated $400,000. After the strike had ended the government signed the previously-announced credit agreement for approximately $U.S.4,000,000 with the West German firm Salzgitter, the credit to be used for machinery and equipment for the tin mines.

★

The Las Adrianitas (Copiapo) iron ore mine in Chile, which is owned by the Japanese Mitsubishi group, started production in late 1960 at an estimated rate of 600,000 tons for the first year, which is to be doubled in succeeding years.

★

The Yugoslavian lead and zinc producers, Trepca, at Kosovska Mitrovica, are to build an accumulator and zinc electrolysis plant involving an expenditure of 5,000,000,000 dinars on foreign equipment. The annual production targets include 18,000 tonnes of zinc, and 40,000 tonnes of sulphuric acid.

★

The Peruvian Government has declared an area around Carabaya (near Puno) to be reserved land, and has forbidden further private mineral exploration in the area until it has determined the extent of iron, copper and nickel deposits recently discovered there.

★

Mineral and Mining Exports Proprietary Ltd. are to set up a £A5,000,000 sponge iron plant at Scott River in Western Australia. Agreement on the general conditions for the plant, which is to be based on low-grade iron ore deposits in the southern part of the State, has been reached with the Western Australian Government. The first stage, to be completed by the end of 1964, will comprise a plant with an annual capacity of 250,000 tons of pelletized sponge iron; a second stage, to be completed in 1966, will double the capacity, while a third phase will ultimately raise it to 1,000,000 tons a year.

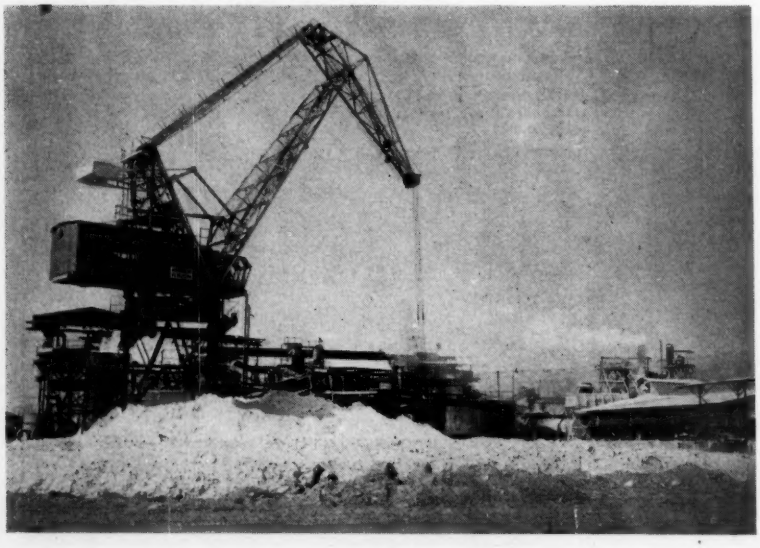
★

In the proposed $25,000,000 aluminium project, now being negotiated between the Reynolds Aluminium group and the Turkish Government, it is proposed to use imported bauxite initially, but that ore from the Antalya region should be employed later.

★

The New Parkside Colliery, at Newton-le-Willows, Lancs., will involve ten miles of tunnelling with forty junctions. Work on this N.C.B. project, part of the £2,000,000 development scheme in the South West Lancashire coalfield, will begin on March 1, and it is expected that the first coal will be taken from Parkside early in 1962. Contract for mine drivages has been awarded to Wimpeys, and the tunnelling is expected to be completed by 1963, when the colliery will go into full production.

General view of the potash refinery at the Dead Sea Works in Sodom



Personal

The G.Q. Parachute Co. of Woking announced recently that George Angus and Co. Ltd., have been appointed sole distributors in the U.K., Eire and certain overseas territories for their range of industrial safety harnesses and ancillary equipment. Distribution of car safety harnesses will continue to be handled by the G.Q. Co. The industrial harnesses set a new standard of safety for constructional operations, and here specific reference may be made to mine shaft workers, quarrymen and all others working at dangerous heights or above dangerous substances

Soviet and Indonesian experts completed their survey of Kalimantan, which has been carried out to determine the extent of deposits of iron ore, coal, limestone and quartz. Further surveying for bauxite at Kidjang on Bintan Island is still proceeding.

*

The chief geologist of the Diamond Corporation Sierra Leone and the chief consulting engineer of Anglo American Corporation have arrived in Sierra Leone reports Barclays Bank, D.C.O., in connection with the prospecting agreement for gold, platinum and diamonds signed with the government in July 1960. The Diamond Corporation Sierra Leone is to bear all expenses of prospecting, and if it finds economically workable deposits, the government has agreed that mining rights will be granted in the future to any other company, with the proviso that the government can acquire shares in any company formed to exploit such deposits.

*

A local section of the Institution of Mining and Metallurgy has been formed in Ghana, and has held its inaugural meeting at Tarkwa. Plans for a field day and the first annual dinner of the section are being prepared.

Mr. D. K. Fraser, joint managing director of G. A. Harvey & Co. (London) has been appointed managing director. Mr. H. E. Cooper has relinquished his office of joint managing director, but remains a director of the company.

*

Powell Duffryn announce the following appointments: Mr. W. H. Sharland, deputy chairman of Powell Duffryn, joins the board of Gulf Radiators; Mr. A. C. Hazel, managing director of Hurseal, has been appointed to the board of Janitor Boilers; Mr. K. M. D. Johns has joined the Group, from Mobil Oil Co., and has been appointed to the boards of Janitor Boilers, Hurseal and Gulf Radiators; Mr. R. H. Stewart, managing director of Janitor Boilers, has joined the board of Hurseal; Mr. R. Turner, managing director of Powell Duffryn Technical Services, and deputy chairman of Powell Duffryn Carbon Products, joins the boards of Janitor Boilers and Gulf Radiators.

*

Mr. Norman Welch has been appointed sales manager of A. G. Wild and Co.

*

Ruston-Bucyrus announce that Mr. G. E. Savory has been appointed assistant managing director, and Mr. F. Wildmore has been appointed to the board of the company as director and commercial manager.

*

Mr. W. J. McBrian, chairman and managing director of the Caterpillar Tractor Co., is returning to the U.S.A. in March to resume his duties as a vice-president of the parent company, Caterpillar Tractor Co., Preoria, Ill. Mr. M. A. Clements is to succeed Mr. McBrian as chairman and managing director of the British company. Mr. Clements was previously managing director of Caterpillar of Australia Pty.

*

Mr. Harry Richards, is retiring from the chairmanship of Wolf Electic Tools, after 53 years of service with the company. Mr. Richards will retain his seat on the board of Wolf Electric Tools (Holdings).

*

George Kent have appointed Mr. Rodney Kent to be deputy chairman, and Mr. Walter May to be assistant managing director of the company; Mr. John G. Vaughan, managing director of the Charterhouse Finance Corporation, has also been appointed a director of George Kent.

*

Mr. E. H. Browne, deputy-chairman of the National Coal Board, has been presented with the Medal of the Institution of Mining Engineers, the highest mining award. He is the fourth living mining engineer to hold this distinction. Mr. Browne was president of the Institution in 1957/58.

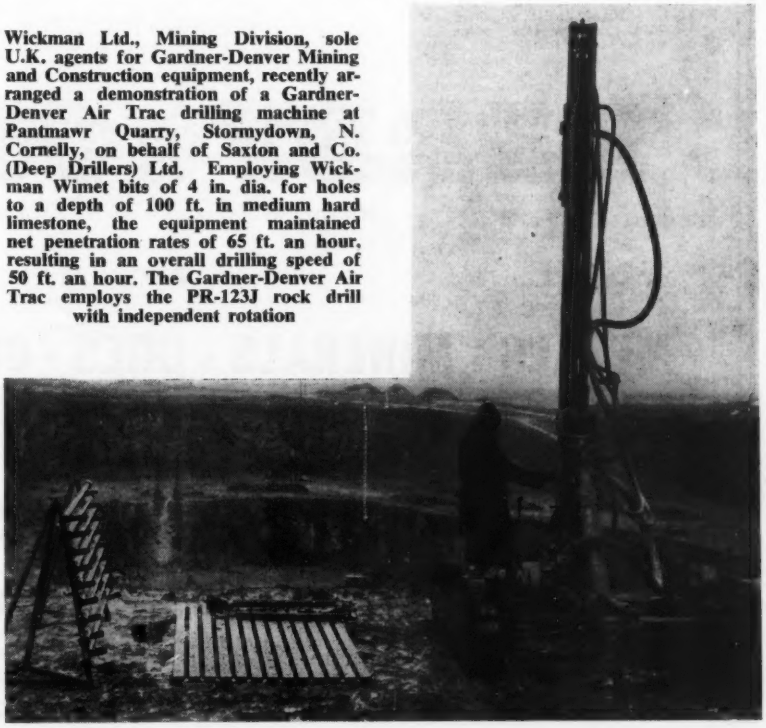
*

BTR Industries announces the appointment of Mr. Ian Keith to the board of its subsidiary, British Moulded Hose Co.

*

American Metal Climax announce that Mr. Howard Blank has been appointed manager of sales for OFHC brand copper and alloys produced by the Amco Division.

Wickman Ltd., Mining Division, sole U.K. agents for Gardner-Denver Mining and Construction equipment, recently arranged a demonstration of a Gardner-Denver Air Trac drilling machine at Pantmawr Quarry, Stormydown, N. Cornelly, on behalf of Saxton and Co. (Deep Drillers) Ltd. Employing Wickman Wimet bits of 4 in. dia. for holes to a depth of 100 ft. in medium hard limestone, the equipment maintained net penetration rates of 65 ft. an hour, resulting in an overall drilling speed of 50 ft. an hour. The Gardner-Denver Air Trac employs the PR-123J rock drill with independent rotation



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Metals and Minerals

World Industry Consumes More Silver

Silver prices were steady and demand was strong in world markets throughout the year, report Handy and Harman in their *Review of the Silver Market in 1960*.

The company estimates that consumption of silver throughout the non-Communist world during 1960 amounted to 319,300,000 oz., an increase of 7 per cent over 1959. Industrial uses increased by about 5 per cent and totalled 226,000,000 oz. Consumption for coinage increased by about 11 per cent and amounted to 93,300,000 oz. In both categories, nearly half was accounted for by the U.S.

Total silver production for non-Communist countries is placed at about 202,500,000 oz., an increase of about 10 per cent from the previous year. In this connection, however, it is pointed out that production during 1959 was affected by prolonged strikes in the U.S., and the curtailed output in that year was to some extent recovered in 1960. Based on these estimates, total world consumption during 1960 exceeded new production by some 116,800,000 oz. New production, however, is only one source of silver.

According to Handy and Harman, total consumption of silver by industrial users in the U.S. amounted to 100,000,000 oz. and was about 3 per cent lower than the revised figure for 1959. Demand for silver in metal joining, electrical and electronic fields was down, due largely to the effect on the metal business of reduced production in consumer durable goods. However, the growing number of applications for silver, for military as well as civilian purposes, helped to offset the drop in some of the more established uses.

Imports of silver in refined and unrefined form into the U.S. during 1960 amounted to about 60,300,000 oz. Excluding returns against lend-lease of 4,600,000 oz., the balance of 55,700,000 oz. was about 13 per cent below the comparable figure for 1959.

Free silver stocks of the U.S. Treasury constitute an important source of supply for domestic industry. On December 31, 1960, these amounted to 123,500,000 oz., a drop of more than 30 per cent from the previous year.

Consumption of silver outside the U.S. maintained a high level during 1960. In Britain, however, industrial consumption amounted to only 16,500,000 oz., a decline of approximately 1,000,000 oz. from the 1959 total being attributed to a falling off in demand during the second half of the year. In Western Germany, on the other hand, consumption of silver for industrial uses amounted to about 40,200,000 oz., a 20 per cent increase over 1959. In France, industrial consumption at about 13,000,000 oz. was 23 per cent higher than in the previous year. The largest increase, however, was in Japan, where consumption amounted last year to 21,600,000 oz., a gain of nearly 60 per cent over 1959 and well over twice the 1958 figure. Production in Japan, estimated at 9,500,000 oz. for 1960, was far short of industrial needs and substantial amounts had to be imported.

For the past two years the French coinage programme has been an item of considerable significance in world silver markets. Handy and Harman are advised that a total of 12,200,000 oz. was used in this programme during 1960 and that 18,600,000 oz. have been consumed since its inception two years ago. It is understood that the total programme will involve approximately 58,000,000 oz. Purchases by the French Mint for this purpose have been an important factor in world silver markets during 1959 and 1960 and presumably will continue at about the same rate in 1961.

The Italian coinage programme, authorized in 1958, has also been an item of interest in world silver markets. It originally called for a total of 24,000,000 oz. of silver, of which about 18,000,000 oz. have been used. No silver appears to have been purchased as yet, substantial government stocks having been available, but it is understood that the Italian Mint may need to enter the market during the coming year.

Throughout most of last year the pressure of world demand resulted in higher prices abroad than those published in New York. Quotations in the London market for prompt delivery ranged from a high of 80¼d. per troy oz. at the beginning of the year to a low of 79d. on March 18. The closing quotation for the year was 79⅛d. (At the time of writing it is 79⅛d.).

On the subject of future supply, Handy and Harman see no cause for concern as to the availability of sufficient silver for industry's future requirements. They point out that, historically, there have always been secondary sources of silver becoming available to the market at different price levels.

There is no present indication that the new administration is planning any change in the Treasury's silver policies. So long as these policies remain unchanged, the short-term outlook is for continued price stability in the U.S. The longer-term outlook, however, is that higher price levels for silver can eventually be expected.

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Speaking at Washington early this year, Dr. Elgin Groseclose, of Groseclose, Williams and Associates, financial analysts, forecast that U.S. Treasury reserves of disposable silver might face depletion in the next two years. In his view, mounting demand and steadily reduced supplies coupled with static mine outputs, point to higher silver prices.

NICKEL IN NEW CALEDONIA

A sharp rise in New Caledonia's nickel production was achieved in 1960 as a result of a large modernization programme, states Le Nickel. Output of nickel ore reached 1,298,000 tonnes against 701,000 tonnes in 1959. Production of refined nickel and nickel oxide

LONDON METAL AND ORE PRICES, FEB. 2, 1961

METAL PRICES

Aluminium, 99.5%, £186 per ton
Antimony—
English (99%) delivered, 10 cwt. and over £210 per ton
Arsenic, £400 per ton
Bismuth (min. 1 ton lots) 16s. lb. nom.
Cadmium 11s. 0d. lb.
Cerium (99%) net, £15 0s. lb. delivered U.K.
Chromium, Cr. 99% 6s. 11d./7s. 4d. lb.
Cobalt, 12s. lb.
Germanium, 99.99%, Ge. kilo lots 2s. 5d. per gram
Gold, 252s. 0d.
Iridium, £20/£23 oz. nom.
Lanthanum (98%/99%) 15s. per gram.
Magnesium, 2s. 2½d./2s. 3d. lb.
Manganese Metal (96%/98%) £275/£285
Nickel, 99.5% (home trade) £600 per ton
Osmium, £18/£22 oz. nom.
Osmiridium, nom.
Palladium, Imported, £8 12s. 6d.
Platinum U.K. and Empire Refined £30 5s.
Imported £28/£28¼
Quicksilver, £69 ex-warehouse
Rhodium, £43/£45 oz.
Ruthenium, £14/£16 oz. nom.
Selenium, 46s. 6d. per lb.
Silver, 79⅛d. f. oz. spot and 80d. f'd.
Tellurium, 28s. 6d. lb.

ORES AND OXIDES

Antimony Ore (60%) basis	25s. 0d./27s. 6d. per unit c.i.f.
Beryl (min. 10 per cent BeO)	240s./245s. per l. ton unit BeO
Bismuth	30% 5s. 0d. lb. c.i.f.
	20% 3s. 3d. lb. c.i.f.
Chrome Ore—	
Rhodesian Metallurgical (semifriable 48%) (Ratio 3 : 1)	£15 5s. 0d. per ton c.i.f.
" Hard Lumpy 45% (Ratio 3 : 1)	£15 10s. 0d. per ton c.i.f.
" Refractory 40%	£11 0s. 0d. per ton c.i.f.
" Smalls 44% (Ratio 3 : 1)	£13 5s. 0d. per ton c.i.f.
Baluchistan 48% (Ratio : 3 : 1)	£11 15s. 0d. per ton f.o.b.
Columbite, Nigerian quality, basis 70% combined pentoxides (Ratio 10 : 1) Nb_2O_5 : Ta_2O_5	165s./170s. 0d. per l. ton unit c.i.f.
Fluorspar—	
Acid Grade, Flotated Material	£22 13s. 3d. per ton ex. works
Metallurgical (75/80% CaF_2)	156s. 0d. ex. works
Lithium Ore—	
Petalite min. 3½% Li_2O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Lepidolite min. 3½% Li_2O	50s. 0d./55s. 0d. per unit f.o.b. Beira
Amblygonite basis 7% Li_2O	75s./85s. per ton f.o.b. Beira
Magnesite, ground calcined	£28 0s./£30 0s. d/d
Magnesite Raw (ground)	£21 0s./£23 0s. d/d
Manganese Ore Indian—	
Europe (46%-48%) basis 60s. 0d. freight	73d./75d. c.i.f. nom.
Manganese Ore (43%-45%)	69d./71d. c.i.f. nom.
Manganese Ore (38%-40%)	nom.
Molybdenite (85%) basis	8s. 11d. per lb. f.o.b.)
Titanium Ore—	
Rutile 95/97% TiO_2 (prompt delivery)	£27 0s. 0d. per ton c.i.f. Aust'n
Ilmenite 50/52% TiO_2	£11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%)	140s. 0d./145s. 0d. per unit c.i.f
Vanadium—	
Fused oxide 95% V_2O_5	7s. 6d./8s. per lb. V_2O_5 c.i.f.
Zircon Sand (Australian) 65-66% ZrO_2	£16/£16 10s. ton c.i.f

totalled 9,631 tonnes against 6,536 and that of ferronickel 11,408 (4,901).

Le Nickel's financial turnover rose by 24 per cent, having increased less than production because the company's selling prices were lowered in an effort to become competitive on the world markets.

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A recent issue contained a note on Cuban mining problems (January 20, 1961, p. 69). We have since seen a statement in the *New York Times* to the effect that, according to Russian engineers at present in Cuba, the Moa Bay nickel plant is now useless owing to the corrosion of equipment.

U.S. ALUMINIUM PROSPECTS IN 1961

The Commerce Department at Washington, which, in general, appears to be taking rather a bearish view of metal prospects in the immediate future, has not a great deal of cheer to offer aluminium producers in its horoscope for 1961. Shipments, it states, can be expected to run at about the same level as those of 1960 or perhaps a little higher.

Total 1960 shipments (all products were estimated by the Business and Defence Services at approximately 2,375,000 tons—a decline of 6 per cent from the record total of 2,480,000 tons reported for 1959. On the other hand, production of primary aluminium rose last year to the record volume of about 2,010,000 tonnes, being 3 per cent higher than the output of 1,953,000 tons. Shipments to domestic consuming industries alone, excluding exports, fell by about 13 per cent in 1960. However, actual domestic usage during the year is expected to show an increase over 1959, since consumers drew heavily upon built-up inventories. Total exports in the first ten months of 1960 are given as 320,000 tons, being an increase of 181 per cent over the 121,300 tons shipped in the corresponding period of 1959. Imports during the same period declined by 34 per cent to 254,400 tons.

Mr. Lawrence A. Harvey, chairman of Harvey Aluminium, stated that the major ailments affecting the industry in 1960 were price cutting, excessive use of consignment selling, and an overextension of credit by producers and distributors. He foresees prospects of some relief in these categories during 1961, together with some improvement in volume and demand.

While U.S. motor car production this years is expected to be less than that of 1960, aluminium usage per car is likely to increase. According to Mr. Robert B. McKee, vice-president for sales of Alcoa, the average 1961 U.S.-built car uses 62.8 lb. of aluminium, 15 per cent more than the 1960 models. By 1965, the average car will require at least 115 lb. of aluminium, it was stated, and by 1970 300 lb. per car would not be extraordinary.

Increased usage of aluminium in containers and packages is also anticipated because of greater use of foil packaging and aluminium cans, while the rather higher level of activity expected in appliances and other consumer goods should lead to more aluminium being used for these products. Aluminium consumption in building and construction is also likely to increase.

Imports of crude aluminium have had no injurious effect on the U.S. domestic industry, an official of Aluminium Ltd. told the Tariff Commission. On the contrary, contended the speaker, imports have been essential to the maintenance of U.S. manufacturing operations and they should therefore be encouraged to the fullest extent possible.

Primary aluminium is among the items on which the U.S. may offer tariff reductions in forthcoming negotiations of the General Agreement on Tariffs and Trade. Aluminium Ltd. urged the Tariff Commission to support the maximum possible reduction under the 1930 Tariff Act. The existing duty is 1¼ c. per lb. equivalent on the basis of 1960 imports to about 5 per cent *ad valorem*. This tariff was described by Aluminium Ltd. as a wholly unnecessary burden on trade, which could safely be removed completely if that were possible under the law.

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Officials of Péchiney are at present visiting Argentina to discuss with the government the possibility of building an aluminium plant. The talks are taking place in conjunction with Kaiser Aluminium, with which company Péchiney are already associated in a similar venture in Spain. The plan put forward by the two companies envisages a plant with an annual capacity of 25,000 tonnes.

CLIMAX MOLYBDENUM'S EXPANSION PROGRAMME

Consumption of molybdenum has been steadily rising and the outlook for this metal with its important high temperature and space-age uses, is regarded as very favourable. With the margin between supply and demand by no means large, it is scarcely surprising that Climax Molybdenum should have announced its intention to spend $20,000,000 on increasing output at its Bartlett Mountain Mine in Colorado. In announcing this programme, Mr. Robert Henderson, vice-president for Climax's Western operations, stated that at the Climax mine the record number of 1,933 employees raised production to 33,000 tons of molybdenum ore daily throughout 1960. Ore extracted from Bartlett Mountain in 1960 produced 25,000 s.tons of molybdenum. By-products from the latter mine were some 500 s.tons of tungsten and a "trickle" of the only tin so far recovered in the U.S.

The $20,000,000 development program is designed not only to meet new market demands but to put the Colorado mine in a position to meet possible competition from potential new alloy materials and from other deposits of molybdenum.

Copper · Tin · Lead · Zinc

(From Our London Metal Exchange Correspondent)

Once again, in spite of continuing pointers to lower metal prices in the near future, the markets have remained steady largely due to the first impact of President Kennedy's speech on Monday. It seems that his points covering rearmaments and assisting the U.S. economy were given prior consideration; later there was a realization that anything which he does cannot become effective immediately. Also, there will be forceful opposition from Republican quarters in view of the fact that the then Republican President said only a few weeks ago that the U.S. economy was not in too bad a state.

U.S. COPPER CONSUMPTION DOWN IN '60

The price structure for copper throughout the world remains unchanged, although there has been a slightly firmer tendency in the scrap copper price in the U.S., where the customs smelters are now paying 23 c. per lb. for their intake, which is a rise of ¼ c. per lb. over their figure last week. In London, prices showed no definite trend until Tuesday when they opened very firm. This firmness was not sustained, as consumer buying tended to dry up on the rise. The contango was maintained and stocks in official warehouses rose a further 540 tons to a total of 15,860 tons.

At the end of last week the U.S. Copper Association's figures for December showed that both deliveries of fabricated products and new business booked by the U.S. brass and wire mills and foundries showed a substantial decline, together with an increase in the stocks held. The actual figures, with the November comparisons in parentheses, were (in s.tons):

Shipments to consumers	81,167	(107,057)
New business booked totalled	90,904	(107,335)
whilst unfulfilled orders totalled ...	126,260	(116,523)
Stocks of refined copper month-end totalled	456,094	(446,098)

Trade sources also indicated that during the whole of 1960 new business booked by fabricators was 16 per cent lower than in 1959 although the consumption of copper fell by only 6 per cent in view of the carry forward of orders from the previous year.

TIN POISED FOR A RISE?

The tin market has become more interesting and there is every sign that, should there be any sustained consumer buying, the price will rise steeply and quickly. Stocks fell last week by 33 tons to a total of 10,007 tons. As was expected, the holding of tin in the buffer stock at September 30, 1960, remained unchanged from the end of the previous two quarters at 10,030 tons. It is believed that no operations were undertaken during the last quarter of 1960 but that during January of this year some small tonnage was bought. Owing to the time lapse before any official statement is made, however, this will not be confirmed until the middle of the year.

Malayan production in December showed a slight increase over the November figure, being 4,646 tons of metal based on 75.62 per cent content in concentrates as opposed to the Novem-

ber figure of 4,518 tons based on 75.66 per cent.

On Thursday the Eastern price was equivalent to £792½ per ton c.i.f. Europe.

WILL U.S. ADD TARIFFS TO QUOTAS?

The lead and zinc markets have both shown a firmer undertone, but most observers feel that the downward movement has not yet come to an end. Demand for both metals is affected by wintry weather in various parts of the world. Stocks of both metals in official warehouses continue to rise and at the end of last week lead stocks showed a further increase of 89 tons to a total of 6,736 tons and zinc stocks rose by 698 tons to give a total of 3,377 tons. The contango in lead is maintained, whereas the zinc quotations stand almost level with a very small backwardation existing from time to time.

The question of the state of the lead and zinc mining industry of the United States is again attracting attention and there seems to be general dissatisfaction with the present set-up. It seems difficult, however, to see any change being introduced, as the only possible one would be in the direction of further restrictions. It is believed that this would be contrary to the present administration's policy for freeing trade, although necessity for doing something for the American economy may mean that steps otherwise unacceptable may be made.

The most recently proposed legislation would provide for an import tax of 2 c. per lb. on both lead and zinc, which would be increased if the domestic market fell below 13½ c. per lb., such increase to be removed when the market price rose above 14½ c. per lb. Import tax would also be levied on concentrates and on the metal content of imported manufactured goods.

The necessity for doing something is underlined by the American Bureau of Metal Statistics figures for lead for 1960 which show that shipments to consumers in 1960 were the lowest for eleven years. The figure of 373,881 s.tons was 17 per cent below the 1959 total. In spite of this, domestic production rose during the year to 416,857 s.tons as compared with 380,674 s.tons in 1959.

OFFICIAL TURNOVERS

Official turnovers in l.tons for the week ending January 28, with the previous week's figures in parentheses, are :—

Copper	11,250	(19,525)
Tin	1,070	(1,075)
Lead	6,775	(7,330)
Zinc	5,425	(5,675)

Closing prices are as follows :

	January 26		February 2	
	Buyers	*Sellers*	*Buyers*	*Sellers*
COPPER				
Cash	£217	£217½	£218½	£218¾
Three months ..	£217½	£217¾	£220	£220½
Settlement ..	£217¼		£218¾	
LEAD				
Current ½ month	£63¾	£63¾	£64¼	£64½
Three months ..	£64¼	£64½	£65¼	£65½
TIN				
Cash	£783½	£784	£786	£786½
Three months ..	£786½	£787	£789½	£790
Settlement ..	£784		£786½	
ZINC				
Current ½ month	£78¼	£78½	£79¼	£79½
Three months ..	£78¼	£78½	£79	£79¼

Mining Finance

The New Deal of South African Uranium

The announcements made during the past week on the details of the uranium contracts bring to a close a period of considerable speculation, concerning not only the arrangements themselves but also the way in which the announcements were likely to be made. In Johannesburg, most people had been anticipating a general statement by the Chamber of Mines followed by the detailed arrangements; and whilst it is not suggested that this would have been the best method, at least it might have led to the inter-mine arrangements being announced on a more uniform basis. As it turns out no two groups have published the same information and it is only Anglo-Vaal who have, as yet, been able to publish sufficient details for the shareholder of any particular company to assess what the true position will be. Seeing that the stretch-out negotiations have been undertaken by the industry as a whole, it seems a pity that closer coordination in the publication of the result has not proved possible.

In the event most of the market rumours have to some degree been confirmed though possibly the least expected item was the apparently high cost of the royalty charges. For some reason, which at this stage is not clear, not all of the royalty charges have been disclosed, but they generally appear to be in the 50s. range. The reason for the high charge is partly that the outstanding loan repayments remain the responsibility of the company holding the contract. This arrangement is of benefit to the purchasing company which is in this manner able to class the loan repayment on its newly acquired quota as a working cost since it forms part of the royalty payment.

Reviewing the general situation, it would appear that the companies which have sold the rights to their contracts have gained a greater immediate cash benefit than might have been expected, whilst those companies which have added to their quota have, of course, considerably extended the operating life of their plants and in so doing have placed themselves in a position from which they will be best able to enter an open market should this develop after 1970.

Certain of the uranium producers, particularly those of the Gold Fields group, appear to have retained their *status quo* except that the price has been improved slightly.

London Market Highlights

Firm features in the South African Gold share market were few and far between during the past week. Interest had already waned in the previous week and matters were not helped by President Kennedy's determination not to raise the dollar price of gold, expressed in his State of the Union speech.

But no matter how dull Kaffirs can appear to be there are always some isolated features of interest. Loraine, for example, were suddenly brought into the limelight when a flurry of Johannesburg buying raised the share price from 25s. 3d. to 29s. Behind the move were rumours that the annual report, due in a week's time, would disclose high gold development values.

The various complicated uranium production announcements made a mixed impression. But those that were understood by the market generally created a bearish impression. That of Harmony was considered particularly depressing and the shares were accordingly lowered by 2s. 6d. to 28s. Similarly, Blyvoor eased to 28s. 3d. and West Rand Consolidated to 19s. 6d. On the other hand, Dominion Reefs remained notably firm at 21s. 6d. after their sharp rise over the previous fortnight from 10s. 6d.; the firmness was understandable enough in the light of the official announcement which showed that the mine might well be able to distribute earnings of around 35s. a share during the next five years.

"Ofsits" (80s.) held their ground thanks to the increased dividend, but the rest of the market tended to ease although it was agreed that very little selling had been seen. Free State Geduld after gaining a short-lived benefit from the high development values announced at the meeting sagged to only 113s. 9d.; Cape offerings were reported and they reflected the conservative dividend policy which has recently been announced.

Finance issues varied little. A bright spot was provided by "Johnnies" which at one time jumped 2s. 3d. to 54s. 9d. on a revival of investment interest caused by the currently high yield offered on the shares.

Although Mr. Kennedy's speech dampened enthusiasm for gold shares, it was interpreted bullishly for a while by the base-metal group. Even coppers, which have been a depressed market for a long time now, began to perk up. Roan improved a few pence to 5s. 7½d. on reported U.S. buying and Messina (16s. 3d.) hardened on some Johannesburg inquiry.

Lead-zincs were also better despite the still obscure outlook for the prices of the same metals. Consolidated Zinc rose 1s. 6d. to 68s. and New Broken Hill hardened to 39s. 6d.

The firmest section however was the tin group. Share prices crept ahead daily on a growing investment demand from both Singapore and London. The East particularly favoured Temoh which spurted from 3s. to 4s. 9d. London was more impressed by Southern Kinta and, helped by the fresh increase in the mine's second interim, the shares climbed from 29s. 3d. to 31s. 6d.

Considering the mines on an individual basis, a table is given below showing the redistribution of the contracts as far as it is possible on the information published. Four of the uranium plants (Vaal Reefs, Stilfontein and the two Free State Joint plants) are to close immediately; whilst five others have arranged their quotas so that they will continue until 1970.

The pattern which emerges from this redistribution of contracts is that, royalty payments aside, the most profitable uranium areas are the West Wits Line and the Klerksdorp field. The exception to this geographical grouping is Harmony in the Free State, where Central Mining has arranged for the plant to continue operating until 1970. However the full significance of this cannot be assessed as the contract price has not been disclosed, though in any event the production cost of under 26s. is comparable with the other areas.

No doubt we shall soon be getting fuller details of the inter-company arrangements, not only on the question of the unpublished prices and royalty charges but also on the details of the participation of the various companies in the joint schemes. However, some at least of the revised uranium earnings per share are now estimable and we shall be examining these next week.

CENTRAL MINING PREFERENCE CAPITAL

The preference capitals of the big South African mining finance houses seldom attract very much attention. Soon one of the five houses having this type of share will have only ordinary capital, if proposals now put forward are accepted. The house concerned is Central Mining and Investment, whose preference shares carry one vote apiece, the same as the ordinary capital. This means that the preference shareholders can have a large say in the running of the company.

The corporation proposes that the preference shares should be exchanged for ordinary shares on the basis of four-for-one. The attractiveness or otherwise of the offer must be seen from three viewpoints, and these are set out in the circular to shareholders.

From the standpoint of revenue, the exchange would operate by a small margin in favour of acceptance, the fixed dividend being equal to 1s. 2.4d. per share, against 1s. 3d. for a quarter of one ordinary. From the standpoint of capital, taking the middle prices just before the offer was published, the offer is even more attractive, for instead of one preference share being valued at 16s. 10½d., the equivalent of one-quarter of an ordinary share was worth 19s. 4½d. By accepting the proposals, the preference capital owners will have a smaller say in the affairs of the corporation.

Thus the choice is between having a relatively large voice, though not a dominating one, or having a bigger income and a larger capital, as well as a more marketable security. Only if one thinks that Central Mining will have to reduce its ordinary dividends in the future, can any serious objection be taken to the proposals. On this score, the board considers that earnings from all sources in the current year will not differ materially from those of last year.

The board proposes to increase the marketability of the ordinary capital by a one-for-one scrip issue, which will reduce the price of the new shares to just under 40s., compared with a net asset value of about 64s. 6d. based on the balance sheet at last March. The scrip issue will be made to all holders of ordinary shares including those received in exchange for the preference capital. Changes are also proposed in the voting rights. Briefly, they would abolish the ban on voting by foreign holders, partly because the board is unaware of the true proportion of shares held by foreigners, and more topically, because South African residents might be deemed foreigners, after the Union becomes a Republic. Obviously, that would be a ludicrous position, and the board is correct in seeking to anticipate it.

RICH DEVELOPMENT ON F.S.G.—HOLDINGS BOUNDARY

Mr. Sidney Spiro's supplementary remarks at last week's annual general meeting of Free State Geduld were encouraging on two counts. In the first place he revealed that the 39 haulage, having reached the Western Holdings boundary was now being pushed in an easterly direction towards the G.D.1 borehole. It will be recalled that this was the borehole which recorded the freak value of 23,037 in. dwt., a result which together with the 12,000 in.-dwt. value at G.D.2. has probably done more than anything else to confuse market thinking about the value of this mine.

The basal reef was intersected in this haulage about 415 ft. west of the surface position of G.D.1, and development in the twin haulages and in a raise gave

Redistribution of Uranium Production

(in s.tons)

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	*Average price per lb. after deducting royalties*
ANGLO AMERICAN											
Free State Joint Scheme (P. Brand, P. Steyn, Welkom, *Loraine, Fred. Cons.*)											
Original Contract	577	577	577	577	577	577					
New Contract	102	remainder, 2793 tons, transferred to other producers, Royalty 54s. 10d.									—
Western Reefs, Vaal Reefs Joint Scheme											
Original Contract	622	622	622	286	286	286					
New Contract	612	645	645	376	376	376	376	376	376	376	58.5s.
Daggafontein											
Original Contract	283	283	283								
New Contract	171	150	150	remainder, 378 tons, transferred to other producers Royalty 52s. 0d.							81.59s.
ANGLO-VAAL											
Hartebeestfontein											
Original Contract	516	516	516	520	524	546					
New Contract	500	500	500	500	450	450	450	450	450	391	58.4s.
Virginia-Merriespruit Joint Scheme											
Original Contract	363	363	363	363	363	182					
New Contract	130	130	130	135	140	71	remainder transferred to Hartebeestfontein Royalty 49s. 0d.				79.18s.
New Klerksdorp											
Original Contract	42	42	42	42							
New Contract	transferred to Hartebeestfontein, Royalty 60s. 0d.										—
CENTRAL MINING											
Blyvooruitzicht											
Original Contract	324	324	324								
New Contract	310	310	310	310	310	162					N.A.
Harmony											
Original Contract	432	432	432	432	310	188					
New Contract	405	405	405	405	405	243	243	243	178	113	N.A.
GOLD FIELDS											
Luipaards Vlei											
Original Contract	378	378	378	381	188						
New Contract	378	378	378	381	188						76.93s.
Vogelstruisbult											
Original Contract	103	103	103	103	26						
New Contract	103	103	103	103	26						97.63s.
West Driefontein, Doornfontein Joint Scheme											
Original Contract	137	137	137	138	138	108					
New Contract	137	137	137	138	138	108					91.42s.
Dominion Reefs											
Original Contract	267	267	267	267	133						
New Contract	238	210	210	remainder, 674 tons transferred to other producers Royalty 54s. 0d.							80.21s.
GENERAL MINING											
Buffelsfontein											
Original Contract	381	381	381	381	381	381	190				
New Contract	380	380	380	380	380	380	380	380	380	380	57.40s.
Stilfontein											
Original Contract	172	172	172	172							
New Contract	transferred to Buffelsfontein, Royalty 51s. 0d.										—
West Rand Cons.											
Original Contract	618	618	618	618							
New Contract	631	524	524	524	524	234	234	234	234	170	55.00s.
J.C.I.											
Randfontein Estates, East Champ D'Or Joint Scheme											
Original Contract	970	970	970	970							
New Contract	788	720	670	510	312	Remainder transferred to other producers Royalty N.A.					94.25s.

an average value of 2,362 in.-dwt. over 170 ft. sampled. This is a far more impressive, if less spectacular, result than that of G.D.1. and suggests that the reef in the area is running at considerably more than double the average grade of existing ore reserves which last September were 21.4 dwt. over 44 in., in itself probably a little higher than the likely average for the mine as a whole.

Mr. Spiro also indicated that the work on the No. 4 main shaft collar was completed and that the headgear installation and other surface work was under way. The importance of this shaft, which is located in the centre of the rich south-western section of the mine and should be operational sometime in 1962, is that it will go some way towards helping in the build-up of milling rate, which even so is not expected to reach the present rated capacity of 125,000 tons for another four or five years.

The comparatively slow build-up in the milling rate at F.S.G., together with the indications in the annual report of a more conservative dividend policy, is mainly to be attributed to the heavy faulting which has been encountered in the rich south-west corner of the mine. This faulting has slowed development and has also been the cause of considerably added expense in installing the ventilation system. There is also reason to think that operations have been hampered by the incidence of khaki shale which has proved a frequent hindrance in the northern part of the O.F.S. field.

This is not to suggest that F.S.G. will ever be other than one of South Africa's really rich gold mines, with perhaps 16 or 17 dwt. overall. Mr. Spiro indicated last week that he was hopeful of maintaining the dividend level of 8s. 6d. and whilst there seems every prospect that this will be possible it is dependent upon an average recovery grade of at least 19 dwt. Free State Geduld is a combination of two separate areas, a very rich portion in the south-west and a generally poor area to the east and north and thus the grade of the mine is dependent upon long-term development policy. Immediate policy is, however, largely dictated by present service facilities.

NO. 3 SHAFT AREA AT WELKOM

Welkom now seems well on the way to overcoming its early handicap of having had to do so much of its initial development in its lower grade areas. The crucial factor in this improvement has been the sinking of the No. 3 shaft and subsequent development from it. The importance of this may be gauged from the fact that during the year to September last about 33 per cent of total mine development came from this area, whereas since the end of the financial year the average has been around 50 per cent. Indeed during January, as the Chairman disclosed at Welkom's annual meeting last week, development on the basal reef in the No. 3 shaft area proved over 98 per cent payable, with an average of 647 inch-dwts against an average of 592 inch-dwts in this period for the mine as a whole. In the December quarter the average for the mine was 485 inch-dwts and for the 12 month period to September last it was 458. It will be interesting to see how quickly the development of the No. 3 shaft area is reflected in a more rapid rise in mill grade.

JANTAR NIGERIA'S HIGHER DIVIDEND

Conditions in the tin and columbite markets improved during the year to September 30, 1960; consequently Jantar Nigeria received more revenue, £236,756 against £200,873. However, a large part of the increase was absorbed by higher mining costs, so that the profit before tax rose only by £2,600 to £44,020 as compared with £42,681. Taxation on the other hand was lower and the net profit improved to £25,720 from £21,681.

The dividend rate was raised to 20 per cent from 15 per cent, though this meant that the company had to take a small part of the payment from a £3,516 provision for taxation no longer required. However, the further improvement in the tin and columbite markets, which has led to greatly increased outputs during the first three months of the present year, was doubtless the main factor in the raising of the dividend.

The columbite position is now much better than a year ago, for the reserves, thanks to the primary columbite on the Kuru III property, stand at 4,964 tons against 1,796 a year ago. The tin position has also changed, though not so radically. The year's prospecting disclosed 561 tons of tin, and as production took only 203 tons, there was a net addition of 358 tons, bringing the reserve total up to 1,762 tons.

The year's expenditure on prospecting and on opening up the treatment plant for the primary columbite deposit has squeezed the liquid position, which however is still in a healthy condition, since the cash holding at end-September was £20,257, backed by government securities with a market value of £71,556. Over the year the fixed assets rose in value by £50,848, of which £27,345 came from depreciation.

The company spent during the year £7,158 on the Nigerian barites venture: but since this seemed likely to need more cash than the company is prepared to put up, a half share has been sold. The news of the barites venture is very satisfactory, for Mr. R. T. Janson says that a large tonnage of barites has been indicated to date.

Mr. Jansen's statement also contains an echo of the Bisichi bid last summer for the Jantar shares. He estimates that Bisichi hold between 25 and 30 per cent of the capital.

SOME RECENT TIN DIVIDENDS

Geevor Tin Mines has declared an interim for the year to March 31 next of 6d. per share. Last year the interim was also 6d. followed by a final of 2s.

Amalgamated Tin Mines of Nigeria has declared an interim of 10 per cent (6d. per share) for the year ending March 31 next. Last year's interim of 8 per cent was followed by a final of 12 per cent.

Kamunting Tin Dredging has declared an interim of 12½ per cent (7½d. per share) for the year to March 31 next. Last year the interim was 10 per cent followed by a final of 25 per cent.

Southern Kinta Consolidated is paying a second interim of 35 per cent for the year to March 31 next. This payment follows a first interim for the current year of 17½ per cent making a total of 52½ per cent as compared with 37½ per cent for the first two interims last year. Last year's final was 62½ per cent.

Ofsits Pay More.—The final dividend from Orange Free State Investment Trust for the year to December 31 last is to be 3/-d. per 10/- share (3d. more than last year) which with the interim makes a total distribution of 5/- for the year against 4/9d.

Subject to audit net profit after tax mounted to £3,143,000 (£2,654,364). An amount of £365,000 (Nil) has been placed to general reserve which now totals £6,400,000.

Writs Results.—Subject to audit the net profit before tax of West Rand Investment Trust for 1960 totalled £2,341,000 (£2,250,856). A sum of £550,000 (£400,000) has been put to general reserve which now stands at £5,500,000.

The dividend distribution for the year remains unchanged at a total of 3/6d. per share.

Amits Higher Distribution.—Anglo American Investment Trust has declared a final dividend of 12/6d. plus a bonus of 5/-d. on its £1 shares which together with the June interim makes a total of 25/- for the year against 22/6d. in 1959.

Subject to audit net profit after tax amounted in 1960 to £3,804,000 (£3,407,976). General reserve has been increased by £500,000 (same) and now totals £7,250,000.

Vereeniging Estates Dividend Unchanged.—With a final dividend of 5/6d. Vereeniging Estates brings its dividend distribution for 1960 to a total of 8/6d. per stock unit. This shows no change on previous year.

For the company itself net profit after tax amounted to £1,405,521 (£1,387,689). A sum of £250,000 (£100,000) has been transferred to general reserve.

At the British Trade Fair in Moscow, Fisher and Ludlow are using a new presentation to exhibit products and equipment of their material handling division, including the Flowmaster Conveyor System. Visitors, by operating a teleprinter, can decide the sequence of articles to be fed from the storage conveyor lines on to a feeder or main conveyor. A teleprinter translates the instructions into punched tape, and a control unit interprets them and operates the conveyor control mechanism so that visitors can see their instructions automatically carried out.

BURMA MINES LIMITED

reports that the operations of

BURMA CORPORATION (1951) LIMITED

for the Quarter ended September 30, 1960, resulted in an estimated Net Profit of **K.2.41,600 (£18,120)** compared with **K.4.69,700 (£35,277)** in the previous Quarter.

Details of Revenue, Expenditure, Ore Extraction and Production may be obtained from Central Registration Limited, 9, Basinghall Street, London, E.C.2, upon application.

TANGANYIKA CONCESSIONS LIMITED

CAPTAIN CHARLES WATERHOUSE'S REVIEW

The Annual General Meeting of Tanganyika Concessions Limited was held on January 26, 1961, at the Head Office of the Company, Tanganyika House, Salisbury, Southern Rhodesia, **Captain The Right Honourable Charles Waterhouse, M.C., D.L.,** the Chairman, presiding.

The Chairman addressed the Meeting as follows :—

"The financial year ended on July 31, 1960, showed a profit after taxation of £4,451,766, which compares favourably with the £3,293,993 earned in the year to July 31, 1959. Last year you confirmed a final dividend of 2/3d. and the Board now recommends that that figure should be maintained for the year under review. This final dividend, with the interim dividend of 1/6d. paid last June, gives a total of 3/9d. for the year. In making this recommendation to you the Board felt that the best interest of the shareholders would be served by adopting a conservative dividend policy, having regard to events in the Congo and the need to meet capital demands arising from our existing investments in Africa and elsewhere.

Union Minière

You will be aware that the Union Minière have recently paid an interim dividend of 600 francs per part sociale, as has been their practice during recent years. The Royalty for the same period has also been paid. I should like briefly to explain the origin of this payment. It is not a Royalty in the ordinarily accepted sense of that term, such as a levy per ton for the right to win minerals, but it is a payment for valuable services rendered.

The Union Minière was incorporated to develop discoveries made by and on behalf of Sir Robert Williams, of copper and other minerals in the Katanga, in those days a sparsely populated and disease infected area. Sir Robert, through Tanganyika Concessions Limited, provided half the original capital and the consideration for his discoveries was in the form, usual in such circumstances, of the right to the free issue of founder shares. The Union Minière carried out a capital reconstruction in 1937 when the three types of shares then existing were consolidated into a single class. At the same time the founder rights enjoyed by Tanganyika Concessions on behalf of Sir Robert Williams, and by the Comite Special du Katanga, were relinquished in exchange for a super dividend payable after the distribution of a fixed sum to holders of ordinary shares. It is that super dividend, paid to the Comite Special who in turn passed on two-fifths to your Company, which is now referred to as a Royalty. I think it is desirable that this fact should be clearly understood since, by agreement with the new Congolese Government, the Comite Special du Katanga is in process of dissolution and the Union Minière have made themselves responsible to pay directly to Tanganyika Concessions the super dividend due to them.

In my review, printed in the Annual Report now in your hands, I stress the over-riding importance of the maintenance of law and order and of stable government as a pre-requisite of economic development. It is equally true that trading and industrial undertakings themselves have a definite part to play in creating conditions in which constitutional government can thrive. The Union Minière du Haut-Katanga takes an honourable place beside such great corporations as the Hudson Bay Company of Canada and the British South Africa Company of Rhodesia, as a pioneer which has fostered the health, wealth and prosperity of the area in which it operates.

For over half a century the Union Minière in the Haut Katanga area of the Congo has worked unceasingly to improve conditions of life by the provision of health services and of hospitals, and by building and maintaining primary, secondary and technical schools. These activities must have played no small part in enabling the independent African Goverment of the Province which came into power last July to establish itself on a firmer basis than has been achieved in any other part of the Congo.

In the last six months, while taking no part in politics, the management of the Union Minière has co-operated with established authority whenever called upon to do so. It is reasonable to believe that given a fair chance by the absence of hostile intervention from outside the Congo, Katanga will surmount its political problems and continue its course of economic development and social progress.

Copper Prices & Production

Copper prices on the London market during 1960 moved between a maximum of £279 10s. per long ton on April 25, and a minimum of £218 on October 20. In September and again in October Union Minière production reached record levels. Thereafter output was somewhat curtailed to conform with an understanding amongst producers designed to equate supply with world demand. For the year to December 31, 1960, Union Minière copper production was 300,700 metric tons, again a record figure on which I know you would wish me to congratulate all concerned.

The Benguela Railway Company

On the Benguela Railway the satisfactory results for the first nine months shown in my review have been maintained and final figures for 1960 will show a marked improvement on those for 1959.

Copper movements from the Union Minière mines have been on a satisfactory scale and owing to the changed circumstances in the Congo, tonnages recently carried to Lobito show a substantial increase on the preceding year. Manganese ore traffic from the Congo is fully up to the normal level. The movement of Angola iron ore from Robert Williams to the coast is proceeding in accordance with the terms of the contract with the Mining Company. Import traffic to the Congo and to Northern Rhodesia has been well maintained.

Traffic demands on the Railway during the past 18 months have put a heavy additional strain on its resources both in material and in men. Some increased capital expenditure to improve the carrying capacity of the line is inevitable. Steps have been taken to recruit additional train crews which will ease the pressure on the Railway's existing staff. I should like to express the Board's appreciation of the fine work done during the eventful year which has just ended.

New Enterprises

In my review I referred to an opportunity of developing new and potentially profitable enterprises in connection with our subsidiary, Commonwealth Timber Industries Limited. During the last six months the markets and conditions for the manufacture of particle board have been examined both in Great Britain and in Australia.

Through our associated company, Tanganyika Holdings Limited, we have recently taken on a small share in a prospecting enterprise near the Mount Isa mine in Queensland, Australia. The work is under the management of a subsidiary of the Rio Tinto Company Ltd., who hold a major interest.

On behalf of the Board and the shareholders of Tanks, I take this opportunity of thanking the staffs both of this Company and of its associates for their work during the year."

The Report and Accounts were adopted, the payment of the final dividend was approved and the retiring Directors were re-elected.

Publications Received

The U.S. Geological Survey have published instructions for the standard operating procedures for the Kelsh plotter, including a description of equipment, as Book 3, Mapping Procedures, which constitutes part of their series of Topographic Instructions. This publication is obtainable from the U.S. Government Printing Office, Washington 25 D.C., Price 35c.

★

Information on recent technological developments in the Soviet Union and Eastern Europe, is now available in English, in digest form, in a new monthly publication *Soviet Technology Digest* edited by M. M. Barash and P. L. B. Oxley, and published by Pergamon Press, Headington Hill Hall, Oxford, and at 122 East 55th St., New York, 22 N.Y. Two of the largest sections are devoted to Metallurgy and to Instruments and Automation. This periodical, which meets a long felt need, is obtainable at an annual subscription rate of £10 ($30.), and should prove of importance for industrial and technological research. The publishers also have a follow-up service, which will allow subscribers to obtain full translations of any article included in the Digest for a further charge.

For sale: Complete Flotation Plant. Cap. 80-100 t.p.d. in good maintenance ready for transfer. Write to: Kupferbergbau Mitterberg G.m.b.H. Muehlbach/Hochkoenig, Austria.

totalled 9,631 tonnes against 6,536 and that of ferronickel 11,408 (4,901).

Le Nickel's financial turnover rose by 24 per cent, having increased less than production because the company's selling prices were lowered in an effort to become competitive on the world markets.

*

A recent issue contained a note on Cuban mining problems (January 20, 1961, p. 69). We have since seen a statement in the *New York Times* to the effect that, according to Russian engineers at present in Cuba, the Moa Bay nickel plant is now useless owing to the corrosion of equipment.

U.S. ALUMINIUM PROSPECTS IN 1961

The Commerce Department at Washington, which, in general, appears to be taking rather a bearish view of metal prospects in the immediate future, has not a great deal of cheer to offer aluminium producers in its horoscope for 1961. Shipments, it states, can be expected to run at about the same level as those of 1960 or perhaps a little higher.

Total 1960 shipments (all products were estimated by the Business and Defence Services at approximately 2,375,000 tons—a decline of 6 per cent from the record total of 2,480,000 tons reported for 1959. On the other hand, production of primary aluminium rose last year to the record volume of about 2,010,000 tonnes, being 3 per cent higher than the output of 1,953,000 tons. Shipments to domestic consuming industries alone, excluding exports, fell by about 13 per cent in 1960. However, actual domestic usage during the year is expected to show an increase over 1959, since consumers drew heavily upon built-up inventories. Total exports in the first ten months of 1960 are given as 320,000 tons, being an increase of 181 per cent over the 121,300 tons shipped in the corresponding period of 1959. Imports during the same period declined by 34 per cent to 254,400 tons.

Mr. Lawrence A. Harvey, chairman of Harvey Aluminium, stated that the major ailments affecting the industry in 1960 were price cutting, excessive use of consignment selling, and an over-extension of credit by producers and distributors. He foresees prospects of some relief in these categories during 1961, together with some improvement in volume and demand.

While U.S. motor car production this years is expected to be less than that of 1960, aluminium usage per car is likely to increase. According to Mr. Robert B. McKee, vice-president for sales of Alcoa, the average 1961 U.S.-built car uses 62.8 lb. of aluminium, 15 per cent more than the 1960 models. By 1965, the average car will require at least 115 lb. of aluminium, it was stated, and by 1970 300 lb. per car would not be extraordinary.

Increased usage of aluminium in containers and packages is also anticipated because of greater use of foil packaging and aluminium cans, while the rather higher level of activity expected in appliances and other consumer goods should lead to more aluminium being used for these products. Aluminium consumption in building and construction is also likely to increase.

Imports of crude aluminium have had no injurious effect on the U.S. domestic industry, an official of Aluminium Ltd. told the Tariff Commission. On the contrary, contended the speaker, imports have been essential to the maintenance of U.S. manufacturing operations and they should therefore be encouraged to the fullest extent possible.

Primary aluminium is among the items on which the U.S. may offer tariff reductions in forthcoming negotiations of the General Agreement on Tariffs and Trade. Aluminium Ltd. urged the Tariff Commission to support the maximum possible reduction under the 1930 Tariff Act. The existing duty is 1¼ c. per lb. equivalent on the basis of 1960 imports to about 5 per cent *ad valorem*. This tariff was described by Aluminium Ltd. as a wholly unnecessary burden on trade, which could safely be removed completely if that were possible under the law.

*

Officials of Péchiney are at present visiting Argentina to discuss with the government the possibility of building an aluminium plant. The talks are taking place in conjunction with Kaiser Aluminium, with which company Péchiney are already associated in a similar venture in Spain. The plan put forward by the two companies envisages a plant with an annual capacity of 25,000 tonnes.

CLIMAX MOLYBDENUM'S EXPANSION PROGRAMME

Consumption of molybdenum has been steadily rising and the outlook for this metal with its important high temperature and space-age uses, is regarded as very favourable. With the margin between supply and demand by no means large, it is scarcely surprising that Climax Molybdenum should have announced its intention to spend $20,000,000 on increasing output at its Bartlett Mountain Mine in Colorado. In announcing this programme, Mr. Robert Henderson, vice-president for Climax's Western operations, stated that at the Climax mine the record number of 1,933 employees raised production to 33,000 tons of molybdenum ore daily throughout 1960. Ore extracted from Bartlett Mountain in 1960 produced 25,000 s.tons of molybdenum. By-products from the latter mine were some 500 s.tons of tungsten and a "trickle" of the only tin so far recovered in the U.S.

The $20,000,000 development program is designed not only to meet new market demands but to put the Colorado mine in a position to meet possible competition from potential new alloy materials and from other deposits of molybdenum.

Copper · Tin · Lead · Zinc

(From Our London Metal Exchange Correspondent)

Once again, in spite of continuing pointers to lower metal prices in the near future, the markets have remained steady largely due to the first impact of President Kennedy's speech on Monday. It seems that his points covering rearmaments and assisting the U.S. economy were given prior consideration; later there was a realization that anything which he does cannot become effective immediately. Also, there will be forceful opposition from Republican quarters in view of the fact that the then Republican President said only a few weeks ago that the U.S. economy was not in too bad a state.

U.S. COPPER CONSUMPTION DOWN IN '60

The price structure for copper throughout the world remains unchanged, although there has been a slightly firmer tendency in the scrap copper price in the U.S., where the customs smelters are now paying 23 c. per lb. for their intake, which is a rise of ½ c. per lb. over their figure last week. In London, prices showed no definite trend until Tuesday when they opened very firm. This firmness was not sustained, as consumer buying tended to dry up on the rise. The contango was maintained and stocks in official warehouses rose a further 540 tons to a total of 15,860 tons.

At the end of last week the U.S. Copper Association's figures for December showed that both deliveries of fabricated products and new business booked by the U.S. brass and wire mills and foundries showed a substantial decline, together with an increase in the stocks held. The actual figures, with the November comparisons in parentheses, were (in s.tons):

Shipments to consumers	81,167	(107,057)
New business booked totalled	90,904	(107,335)
whilst unfulfilled orders totalled ...	126,260	(116,523)
Stocks of refined copper month-end totalled	456,094	(446,098)

Trade sources also indicated that during the whole of 1960 new business booked by fabricators was 16 per cent lower than in 1959 although the consumption of copper fell by only 6 per cent in view of the carry forward of orders from the previous year.

TIN POISED FOR A RISE?

The tin market has become more interesting and there is every sign that should there be any sustained consumer buying, the price will rise steeply and quickly. Stocks fell last week by 33 tons to a total of 10,007 tons. As was expected, the holding of tin in the buffer stock at September 30, 1960, remained unchanged from the end of the previous two quarters at 10,030 tons. It is believed that no operations were undertaken during the last quarter of 1960 but that during January of this year some small tonnage was bought. Owing to the time lapse before any official statement is made, however, this will not be confirmed until the middle of the year.

Malayan production in December showed a slight increase over the November figure, being 4,646 tons of metal based on 75.62 per cent content in concentrates as opposed to the Novem

ber figure of 4,518 tons based on 75.66 per cent.

On Thursday the Eastern price was equivalent to £792½ per ton c.i.f. Europe.

WILL U.S. ADD TARIFFS TO QUOTAS?

The lead and zinc markets have both shown a firmer undertone, but most observers feel that the downward movement has not yet come to an end. Demand for both metals is affected by wintry weather in various parts of the world. Stocks of both metals in official warehouses continue to rise and at the end of last week lead stocks showed a further increase of 89 tons to a total of 1,736 tons and zinc stocks rose by 698 tons to give a total of 3,377 tons. The contango in lead is maintained, whereas the zinc quotations stand almost level with a very small backwardation existing from time to time.

The question of the state of the lead and zinc mining industry of the United States is again attracting attention and there seems to be general dissatisfaction with the present set-up. It seems difficult, however, to see any change being introduced, as the only possible one would be in the direction of further restrictions. It is believed that this would be contrary to the present administration's policy for freeing trade, although necessity for doing something for the American economy may mean that steps otherwise unacceptable may be made.

The most recently proposed legislation would provide for an import tax of 2 c. per lb. on both lead and zinc, which would be increased if the domestic market fell below 13½ c. per lb., such increase to be removed when the market price rose above 14½ c. per lb. Import tax would also be levied on concentrates and on the metal content of imported manufactured goods.

The necessity for doing something is underlined by the American Bureau of Metal Statistics figures for lead for 1960 which show that shipments to consumers in 1960 were the lowest for eleven years. The figure of 373,881 s.tons was 17 per cent below the 1959 total. In spite of this, domestic production rose during the year to 416,857 s.tons as compared with 380,674 s.tons in 1959.

OFFICIAL TURNOVERS

Official turnovers in l.tons for the week ending January 28, with the previous week's figures in parentheses, are :—

Copper	... ...	11,250	(19,525)
Tin	... ...	1,070	(1,075)
Lead	... ...	6,775	(7,330)
Zinc	... ...	5,425	(5,675)

Closing prices are as follows :

	January 26		February 2	
	Buyers	*Sellers*	*Buyers*	*Sellers*
COPPER				
Cash	£217	£217½	£218½	£218¾
Three months ..	£217¼	£217½	£220	£220½
Settlement ..	£217¼		£218¾	
LEAD				
Current ½ month	£63½	£63¾	£64¼	£64½
Three months ..	£64½	£64¾	£65¼	£65½
TIN				
Cash	£783½	£784	£786	£786½
Three months ..	£786½	£787	£789½	£790
Settlement ..	£784		£786½	
ZINC				
Current ½ month	£78½	£78¾	£79¼	£79½
Three months ..	£78¾	£78½	£79	£79¼

Mining Finance

The New Deal of South African Uranium

The announcements made during the past week on the details of the uranium contracts bring to a close a period of considerable speculation, concerning not only the arrangements themselves but also the way in which the announcements were likely to be made. In Johannesburg, most people had been anticipating a general statement by the Chamber of Mines followed by the detailed arrangements; and whilst it is not suggested that this would have been the best method, at least it might have led to the inter-mine arrangements being announced on a more uniform basis. As it turns out no two groups have published the same information and it is only Anglo-Vaal who have, as yet, been able to publish sufficient details for the shareholder of any particular company to assess what the true position will be. Seeing that the stretch-out negotiations have been undertaken by the industry as a whole, it seems a pity that closer co-ordination in the publication of the result has not proved possible.

In the event most of the market rumours have to some degree been confirmed though possibly the least expected item was the apparently high cost of the royalty charges. For some reason, which at this stage is not clear, not all of the royalty charges have been disclosed, but they generally appear to be in the 50s. range. The reason for the high charge is partly that the outstanding loan repayments remain the responsibility of the company holding the contract. This arrangement is of benefit to the purchasing company which is in this manner able to class the loan repayment on its newly acquired quota as a working cost since it forms part of the royalty payment.

Reviewing the general situation, it would appear that the companies which have sold the rights to their contracts have gained a greater immediate cash benefit than might have been expected, whilst those companies which have added to their quota have, of course, considerably extended the operating life of their plants and in so doing have placed themselves in a position from which they will be best able to enter an open market should this develop after 1970.

Certain of the uranium producers, particularly those of the Gold Fields group, appear to have retained their *status quo* except that the price has been improved slightly.

London Market Highlights

Firm features in the South African Gold share market were few and far between during the past week. Interest had already waned in the previous week and matters were not helped by President Kennedy's determination not to raise the dollar price of gold, expressed in his State of the Union speech.

But no matter how dull Kaffirs can appear to be there are always some isolated features of interest. Loraine, for example, were suddenly brought into the limelight when a flurry of Johannesburg buying raised the share price from 25s. 3d. to 29s. Behind the move were rumours that the annual report, due in a week's time, would disclose high gold development values.

The various complicated uranium production announcements made a mixed impression. But those that were understood by the market generally created a bearish impression. That of Harmony was considered particularly depressing and the shares were accordingly lowered by 2s. 6d. to 28s. Similarly, Blyvoor eased to 28s. 3d. and West Rand Consolidated to 19s. 6d. On the other hand, Dominion Reefs remained notably firm at 21s. 6d. after their sharp rise over the previous fortnight from 10s. 6d.; the firmness was understandable enough in the light of the official announcement which showed that the mine might well be able to distribute earnings of around 35s. a share during the next five years.

"Ofsits" (80s.) held their ground thanks to the increased dividend, but the rest of the market tended to ease although it was agreed that very little selling had been seen. Free State Geduld after gaining a short-lived benefit from the high development values announced at the meeting sagged to only 113s. 9d.; Cape offerings were reported and they reflected the conservative dividend policy which has recently been announced.

Finance issues varied little. A bright spot was provided by "Johnnies" which at one time jumped 2s. 3d. to 54s. 9d. on a revival of investment interest caused by the currently high yield offered on the shares.

Although Mr. Kennedy's speech dampened enthusiasm for gold shares, it was interpreted bullishly for a while by the base-metal group. Even coppers, which have been a depressed market for a long time now, began to perk up. Roan improved a few pence to 5s. 7½d. on reported U.S. buying and Messina (16s. 3d.) hardened on some Johannesburg inquiry.

Lead-zincs were also better despite the still obscure outlook for the prices of the same metals. Consolidated Zinc rose 1s. 6d. to 68s. and New Broken Hill hardened to 39s. 6d.

The firmest section however was the tin group. Share prices crept ahead daily on a growing investment demand from both Singapore and London. The East particularly favoured Temoh which spurted from 3s. to 4s. 9d. London was more impressed by Southern Kinta and, helped by the fresh increase in the mine's second interim, the shares climbed from 29s. 3d. to 31s. 6d.

Considering the mines on an individual basis, a table is given below showing the redistribution of the contracts as far as it is possible on the information published. Four of the uranium plants (Vaal Reefs, Stilfontein and the two Free State Joint plants) are to close immediately; whilst five others have arranged their quotas so that they will continue until 1970.

The pattern which emerges from this redistribution of contracts is that, royalty payments aside, the most profitable uranium areas are the West Wits Line and the Klerksdorp field. The exception to this geographical grouping is Harmony in the Free State, where Central Mining has arranged for the plant to continue operating until 1970. However the full significance of this cannot be assessed as the contract price has not been disclosed, though in any event the production cost of under 26s. is comparable with the other areas.

No doubt we shall soon be getting fuller details of the inter-company arrangements, not only on the question of the unpublished prices and royalty charges but also on the details of the participation of the various companies in the joint schemes. However, some at least of the revised uranium earnings per share are now estimable and we shall be examining these next week.

CENTRAL MINING PREFERENCE CAPITAL

The preference capitals of the big South African mining finance houses seldom attract very much attention. Soon one of the five houses having this type of share will have only ordinary capital, if proposals now put forward are accepted. The house concerned is Central Mining and Investment, whose preference shares carry one vote apiece, the same as the ordinary capital. This means that the preference shareholders can have a large say in the running of the company.

The corporation proposes that the preference shares should be exchanged for ordinary shares on the basis of four-for-one. The attractiveness or otherwise of the offer must be seen from three viewpoints, and these are set out in the circular to shareholders.

From the standpoint of revenue, the exchange would operate by a small margin in favour of acceptance, the fixed dividend being equal to 1s. 2.4d. per share, against 1s. 3d. for a quarter of one ordinary. From the standpoint of capital, taking the middle prices just before the offer was published, the offer is even more attractive, for instead of one preference share being valued at 16s. 10½d., the equivalent of one-quarter of an ordinary share was worth 19s. 4½d. By accepting the proposals, the preference capital owners will have a smaller say in the affairs of the corporation.

Thus the choice is between having a relatively large voice, though not a dominating one, or having a bigger income and a larger capital, as well as a more marketable security. Only if one thinks that Central Mining will have to reduce its ordinary dividends in the future, can any serious objection be taken to the proposals. On this score, the board considers that earnings from all sources in the current year will not differ materially from those of last year.

The board proposes to increase the marketability of the ordinary capital by a one-for-one scrip issue, which will reduce the price of the new shares to just under 40s., compared with a net asset value of about 64s. 6d. based on the balance sheet at last March. The scrip issue will be made to all holders of ordinary shares including those received in exchange for the preference capital. Changes are also proposed in the voting rights. Briefly, they would abolish the ban on voting by foreign holders, partly because the board is unaware of the true proportion of shares held by foreigners, and more topically, because South African residents might be deemed foreigners, after the Union becomes a Republic. Obviously, that would be a ludicrous position, and the board is correct in seeking to anticipate it.

RICH DEVELOPMENT ON F.S.G.—HOLDINGS BOUNDARY

Mr. Sidney Spiro's supplementary re remarks at last week's annual genera meeting of Free State Geduld were en couraging on two counts. In the firs place he revealed that the 39 haulag having reached the Western Holding boundary was now being pushed in a easterly direction towards the G.D. borehole. It will be recalled that thi was the borehole which recorded th freak value of 23,037 in. dwt., a resul which together with the 12,000 in.-dw value at G.D.2. has probably done mor than anything else to confuse marke thinking about the value of this mine

The basal reef was intersected in thi haulage about 415 ft. west of the surfac position of G.D.1, and development i the twin haulages and in a raise gav

Redistribution of Uranium Production

(in s.tons)

	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	*Average price per lb. after deducting royalties*
ANGLO AMERICAN											
Free State Joint Scheme (P. Brand, P. Steyn, Welkom, *Loraine, Fred. Cons.*)											
Original Contract	577	577	577	577	577	577					
New Contract	102	remainder, 2793 tons, transferred to other producers, Royalty 54s. 10d.									—
Western Reefs, Vaal Reefs Joint Scheme											
Original Contract	622	622	622	286	286	286					
New Contract	612	645	645	376	376	376	376	376	376	376	58.5s.
Daggafontein											
Original Contract	283	283	283								
New Contract	171	150	150	remainder, 378 tons, transferred to other producers Royalty 52s. 0d.							81.59s.
ANGLO-VAAL											
Hartebeestfontein											
Original Contract	516	516	516	520	524	546					
New Contract	500	500	500	500	450	450	450	450	450	391	58.4s.
Virginia-Merriespruit Joint Scheme											
Original Contract	363	363	363	363	363	182					
New Contract	130	130	130	135	140	71	remainder transferred to Hartebeestfontein Royalty 49s. 0d.				79.18s.
New Klerksdorp											
Original Contract	42	42	42	42							
New Contract	transferred to Hartebeestfontein, Royalty 60s. 0d.										—
CENTRAL MINING											
Blyvooruitzicht											
Original Contract	324	324	324								
New Contract	310	310	310	310	310	162					N.A.
Harmony											
Original Contract	432	432	432	432	310	188					
New Contract	405	405	405	405	405	243	243	243	178	113	N.A.
GOLD FIELDS											
Luipaards Vlei											
Original Contract	378	378	378	381	188						
New Contract	378	378	378	381	188						76.93s.
Vogelstruisbult											
Original Contract	103	103	103	103	26						
New Contract	103	103	103	103	26						97.63s.
West Driefontein, Doornfontein Joint Scheme											
Original Contract	137	137	137	138	138	108					
New Contract	137	137	137	138	138	108					91.42s.
Dominion Reefs											
Original Contract	267	267	267	267	133						
New Contract	238	210	210	remainder, 674 tons transferred to other producers Royalty 54s. 0d.							80.21s.
GENERAL MINING											
Buffelsfontein											
Original Contract	381	381	381	381	381	381	190				
New Contract	380	380	380	380	380	380	380	380	380	380	57.40s.
Stilfontein											
Original Contract	172	172	172	172							
New Contract	transferred to Buffelsfontein, Royalty 51s. 0d.										—
West Rand Cons.											
Original Contract	618	618	618	618							
New Contract	631	524	524	524	524	234	234	234	234	170	55.00s.
J.C.I.											
Randfontein Estates, East Champ D'Or Joint Scheme											
Original Contract	970	970	970	970							
New Contract	788	720	670	510	312	Remainder transferred to other producers Royalty N.A.					94.25s.

an average value of 2,362 in.-dwt. over 170 ft. sampled. This is a far more impressive, if less spectacular, result than that of G.D.1. and suggests that the reef in the area is running at considerably more than double the average grade of existing ore reserves which last September were 21.4 dwt. over 44 in., in itself probably a little higher than the likely average for the mine as a whole.

Mr. Spiro also indicated that the work on the No. 4 main shaft collar was completed and that the headgear installation and other surface work was under way. The importance of this shaft, which is located in the centre of the rich south-western section of the mine and should be operational sometime in 1962, is that it will go some way towards helping in the build-up of milling rate, which even so is not expected to reach the present rated capacity of 125,000 tons for another four or five years.

The comparatively slow build-up in the milling rate at F.S.G., together with the indications in the annual report of a more conservative dividend policy, is mainly to be attributed to the heavy faulting which has been encountered in the rich south-west corner of the mine. This faulting has slowed development and has also been the cause of considerably added expense in installing the ventilation system. There is also reason to think that operations have been hampered by the incidence of khaki shale which has proved a frequent hindrance in the northern part of the O.F.S. field.

This is not to suggest that F.S.G. will ever be other than one of South Africa's really rich gold mines, with perhaps 16 or 17 dwt. overall. Mr. Spiro indicated last week that he was hopeful of maintaining the dividend level of 8s. 6d. and whilst there seems every prospect that this will be possible it is dependent upon an average recovery grade of at least 19 dwt. Free State Geduld is a combination of two separate areas, a very rich portion in the south-west and a generally poor area to the east and north and thus the grade of the mine is dependent upon long-term development policy. Immediate policy is, however, largely dictated by present service facilities.

NO. 3 SHAFT AREA AT WELKOM

Welkom now seems well on the way to overcoming its early handicap of having had to do so much of its initial development in its lower grade areas. The crucial factor in this improvement has been the sinking of the No. 3 shaft and subsequent development from it. The importance of this may be gauged from the fact that during the year to September last about 33 per cent of total mine development came from this area, whereas since the end of the financial year the average has been around 50 per cent. Indeed during January, as the Chairman disclosed at Welkom's annual meeting last week, development on the basal reef in the No. 3 shaft area proved over 98 per cent payable, with an average of 647 inch-dwts against an average of 592 inch-dwts in this period for the mine as a whole. In the December quarter the average for the mine was 485 inch-dwts and for the 12 month period to September last it was 458. It will be interesting to see how quickly the development of the No. 3 shaft area is reflected in a more rapid rise in mill grade.

JANTAR NIGERIA'S HIGHER DIVIDEND

Conditions in the tin and columbite markets improved during the year to September 30, 1960; consequently Jantar Nigeria received more revenue, £236,756 against £200,873. However, a large part of the increase was absorbed by higher mining costs, so that the profit before tax rose only by £2,600 to £44,020 as compared with £42,681. Taxation on the other hand was lower and the net profit improved to £25,720 from £21,681.

The dividend rate was raised to 20 per cent from 15 per cent, though this meant that the company had to take a small part of the payment from a £3,516 provision for taxation no longer required. However, the further improvement in the tin and columbite markets, which has led to greatly increased outputs during the first three months of the present year, was doubtless the main factor in the raising of the dividend.

The columbite position is now much better than a year ago, for the reserves, thanks to the primary columbite on the Kuru III property, stand at 4,964 tons against 1,796 a year ago. The tin position has also changed, though not so radically. The year's prospecting disclosed 561 tons of tin, and as production took only 203 tons, there was a net addition of 358 tons, bringing the reserve total up to 1,762 tons.

The year's expenditure on prospecting and on opening up the treatment plant for the primary columbite deposit has squeezed the liquid position, which however is still in a healthy condition, since the cash holding at end-September was £20,257, backed by government securities with a market value of £71,556. Over the year the fixed assets rose in value by £50,848, of which £27,345 came from depreciation.

The company spent during the year £7,158 on the Nigerian barites venture; but since this seemed likely to need more cash than the company is prepared to put up, a half share has been sold. The news of the barites venture is very satisfactory, for Mr. R. T. Janson says that a large tonnage of barites has been indicated to date.

Mr. Jansen's statement also contains an echo of the Bisichi bid last summer for the Jantar shares. He estimates that Bisichi hold between 25 and 30 per cent of the capital.

SOME RECENT TIN DIVIDENDS

Geevor Tin Mines has declared an interim for the year to March 31 next of 6d. per share. Last year the interim was also 6d. followed by a final of 2s.

Amalgamated Tin Mines of Nigeria has declared an interim of 10 per cent (6d. per share) for the year ending March 31 next. Last year's interim of 8 per cent was followed by a final of 12 per cent.

Kamunting Tin Dredging has declared an interim of 12½ per cent (7½d. per share) for the year to March 31 next. Last year the interim was 10 per cent followed by a final of 25 per cent.

Southern Kinta Consolidated is paying a second interim of 35 per cent for the year to March 31 next. This payment follows a first interim for the current year of 17½ per cent making a total of 52½ per cent as compared with 37½ per cent for the first two interims last year. Last year's final was 62½ per cent.

Ofsits Pay More.—The final dividend from Orange Free State Investment Trust for the year to December 31 last is to be 3/-d. per 10/- share (3d. more than last year) which with the interim makes a total distribution of 5/- for the year against 4/9d.

Subject to audit net profit after tax mounted to £3,143,000 (£2,654,364). An amount of £365,000 (Nil) has been placed to general reserve which now totals £6,400,000.

Writs Results.—Subject to audit the net profit before tax of West Rand Investment Trust for 1960 totalled £2,341,000 (£2,250,856). A sum of £550,000 (£400,000) has been put to general reserve which now stands at £5,500,000.

The dividend distribution for the year remains unchanged at a total of 3/6d. per share.

Amits Higher Distribution.—Anglo American Investment Trust has declared a final dividend of 12/6d. plus a bonus of 5/-d. on its £1 shares which together with the June interim makes a total of 25/- for the year against 22/6d. in 1959.

Subject to audit net profit after tax amounted in 1960 to £3,804,000 (£3,407,976). General reserve has been increased by £500,000 (same) and now totals £7,250,000.

Vereeniging Estates Dividend Unchanged.—With a final dividend of 5/6d. Vereeniging Estates brings its dividend distribution for 1960 to a total of 8/6d. per stock unit. This shows no change on previous year.

For the company itself net profit after tax amounted to £1,405,521 (£1,387,689). A sum of £250,000 (£100,000) has been transferred to general reserve.

At the British Trade Fair in Moscow, Fisher and Ludlow are using a new presentation to exhibit products and equipment of their material handling division, including the Flowmaster Conveyor System. Visitors, by operating a teleprinter, can decide the sequence of articles to be fed from the storage conveyor lines on to a feeder or main conveyor. A teleprinter translates the instructions into punched tape, and a control unit interprets them and operates the conveyor control mechanism so that visitors can see their instructions automatically carried out.

BURMA MINES LIMITED

reports that the operations of

BURMA CORPORATION (1951) LIMITED

for the Quarter ended September 30, 1960, resulted in an estimated Net Profit of **K.2.41,600 (£18,120)** compared with **K.4.69,700 (£35,277)** in the previous Quarter.

Details of Revenue, Expenditure, Ore Extraction and Production may be obtained from Central Registration Limited, 9, Basinghall Street, London, E.C.2, upon application.

TANGANYIKA CONCESSIONS LIMITED

CAPTAIN CHARLES WATERHOUSE'S REVIEW

The Annual General Meeting of Tanganyika Concessions Limited was held on January 26, 1961, at the Head Office of the Company, Tanganyika House, Salisbury, Southern Rhodesia, **Captain The Right Honourable Charles Waterhouse, M.C., D.L.,** the Chairman, presiding.

The Chairman addressed the Meeting as follows :—

"The financial year ended on July 31, 1960, showed a profit after taxation of £4,451,766, which compares favourably with the £3,293,993 earned in the year to July 31, 1959. Last year you confirmed a final dividend of 2/3d. and the Board now recommends that that figure should be maintained for the year under review. This final dividend, with the interim dividend of 1/6d. paid last June, gives a total of 3/9d. for the year. In making this recommendation to you the Board felt that the best interest of the shareholders would be served by adopting a conservative dividend policy, having regard to events in the Congo and the need to meet capital demands arising from our existing investments in Africa and elsewhere.

Union Minière

You will be aware that the Union Minière have recently paid an interim dividend of 600 francs per part sociale, as has been their practice during recent years. The Royalty for the same period has also been paid. I should like briefly to explain the origin of this payment. It is not a Royalty in the ordinarily accepted sense of that term, such as a levy per ton for the right to win minerals, but it is a payment for valuable services rendered.

The Union Minière was incorporated to develop discoveries made by and on behalf of Sir Robert Williams, of copper and other minerals in the Katanga, in those days a sparsely populated and disease infected area. Sir Robert, through Tanganyika Concessions Limited, provided half the original capital and the consideration for his discoveries was in the form, usual in such circumstances, of the right to the free issue of founder shares. The Union Minière carried out a capital reconstruction in 1937 when the three types of shares then existing were consolidated into a single class. At the same time the founder rights enjoyed by Tanganyika Concessions on behalf of Sir Robert Williams, and by the Comite Special du Katanga, were relinquished in exchange for a super dividend payable after the distribution of a fixed sum to holders of ordinary shares. It is that super dividend, paid to the Comite Special who in turn passed on two-fifths to your Company, which is now referred to as a Royalty. I think it is desirable that this fact should be clearly understood since, by agreement with the new Congolese Government, the Comite Special du Katanga is in process of dissolution and the Union Minière have made themselves responsible to pay directly to Tanganyika Concessions the super dividend due to them.

In my review, printed in the Annual Report now in your hands, I stress the over-riding importance of the maintenance of law and order and of stable government as a pre-requisite of economic development. It is equally true that trading and industrial undertakings themselves have a definite part to play in creating conditions in which constitutional government can thrive. The Union Minière du Haut-Katanga takes an honourable place beside such great corporations as the Hudson Bay Company of Canada and the British South Africa Company of Rhodesia, as a pioneer which has fostered the health, wealth and prosperity of the area in which it operates.

For over half a century the Union Minière in the Haut Katanga area of the Congo has worked unceasingly to improve conditions of life by the provision of health services and of hospitals, and by building and maintaining primary, secondary and technical schools. These activities must have played no small part in enabling the independent African Goverment of the Province which came into power last July to establish itself on a firmer basis than has been achieved in any other part of the Congo.

In the last six months, while taking no part in politics, the management of the Union Minière has co-operated with established authority whenever called upon to do so. It is reasonable to believe that given a fair chance by the absence of hostile intervention from outside the Congo, Katanga will surmount its political problems and continue its course of economic development and social progress.

Copper Prices & Production

Copper prices on the London market during 1960 moved between a maximum of £279 10s. per long ton on April 25, and a minimum of £218 on October 20. In September and again in October Union Minière production reached record levels. Thereafter output was somewhat curtailed to conform with an understanding amongst producers designed to equate supply with world demand. For the year to December 31, 1960, Union Minière copper production was 300,700 metric tons, again a record figure on which I know you would wish me to congratulate all concerned.

The Benguela Railway Company

On the Benguela Railway the satisfactory results for the first nine months shown in my review have been maintained and final figures for 1960 will show a marked improvement on those for 1959.

Copper movements from the Union Minière mines have been on a satisfactory scale and owing to the changed circumstances in the Congo, tonnages recently carried to Lobito show a substantial increase on the preceding year. Manganese ore traffic from the Congo is fully up to the normal level. The movement of Angola iron ore from Robert Williams to the coast is proceeding in accordance with the terms of the contract with the Mining Company. Import traffic to the Congo and to Northern Rhodesia has been well maintained.

Traffic demands on the Railway during the past 18 months have put a heavy additional strain on its resources both in material and in men. Some increased capital expenditure to improve the carrying capacity of the line is inevitable. Steps have been taken to recruit additional train crews which will ease the pressure on the Railway's existing staff. I should like to express the Board's appreciation of the fine work done during the eventful year which has just ended.

New Enterprises

In my review I referred to an opportunity of developing new and potentially profitable enterprises in connection with our subsidiary, Commonwealth Timber Industries Limited. During the last six months the markets and conditions for the manufacture of particle board have been examined both in Great Britain and in Australia.

Through our associated company, Tanganyika Holdings Limited, we have recently taken on a small share in a prospecting enterprise near the Mount Isa mine in Queensland, Australia. The work is under the management of a subsidiary of the Rio Tinto Company Ltd., who hold a major interest.

On behalf of the Board and the shareholders of Tanks, I take this opportunity of thanking the staffs both of this Company and of its associates for their work during the year."

The Report and Accounts were adopted, the payment of the final dividend was approved and the retiring Directors were re-elected.

Publications Received

The U.S. Geological Survey have published instructions for the standard operating procedures for the Kelsh plotter, including a description of equipment, as Book 3, Mapping Procedures, which constitutes part of their series of Topographic Instructions. This publication is obtainable from the U.S. Government Printing Office, Washington 25 D.C., Price 35c.

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Information on recent technological developments in the Soviet Union and Eastern Europe, is now available in English, in digest form, in a new monthly publication *Soviet Technology Digest* edited by M. M. Barash and P. L. B. Oxley, and published by Pergamon Press, Headington Hill Hall, Oxford, and at 122 East 55th St., New York, 22 N.Y. Two of the largest sections are devoted to Metallurgy and to Instruments and Automation. This periodical, which meets a long felt need, is obtainable at an annual subscription rate of £10 ($30.), and should prove of importance for industrial and technological research. The publishers also have a follow-up service, which will allow subscribers to obtain full translations of any article included in the Digest for a further charge.

For sale: Complete Flotation Plant. Cap. 80-100 t.p.d. in good maintenance ready for transfer. Write to: Kupferbergbau Mitterberg G.m.b.H. Muehlbach/Hochkoenig, Austria.